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INTRODUCTION.

WHILE the immense strides taken by American ornithology during the past score of years has seriously taxed the energies of the amateur to keep within hailing distance, and despite the volume of notes annually published in the various periodicals and books, the demand for complete life histories of even our most familiar birds have not lessened to any great extent. The life of one person would prove far too short to attempt a thorough study of a single species in all its characteristics ; hence the absolute necessity for the co-operative work advocated and practiced by the Wilson Ornithological Chapter to obtain results at all satisfactory.

In spite of the devotion of the leisure moments of five years and the generous aid of a large corps of enthusiasts, the frank acknowledgment that the succeeding pages do faint justice to the subject of this paper, is not a matter of discouragement. Nature's Book will always contain fresh and delightful pages for the curious and observant.

Few have any idea of the magnitude of the literature under the title of a single name, and the unavailability of much of it for a work of this kind, because of its fragmentary or negative nature. A realization of the latter has caused the writer to go to the other extreme in frequent cases, with the hope that the mass of detailed information, while it may detract from the general appearance of the paper, will prove useful timber for a more competent builder, or of value for reference.

As far as it was practicable to do so, the compiler has conscientiously striven to place the credit of observations where it belongs, and the quotation marks are used when the exact language is extracted from publications.

All notes have been taken under the name that has held good for almost a century and a half. This, combined with the impossibility of the average student positively identifying any but the extreme types of the subdivided species, has necessi-

tated the present title. Since the difference which exists is purely geographical, the detracton from the value of the paper on this account can scarcely be more than fictitious.

The enumeration of the localities from which notes were taken, together with those represented in the publications examined, is dispensed with for the simple reason that the list would occupy too much space. It is sufficient to state that no considerable section of the habitat of the Flicker is unrepresented.

I am greatly indebted to the following gentlemen for valuable information, ranging from a local name to extended notes: Stephen J. Adams, Jos. H. Armfield, Paul Bartsch, James Newton Baskett, Jacob Bastion, Jr., Frank A. Bates, A. C. Bent, Allen Brice Blakemore, Lionel F. Bowers, J. H. Bowles, Clement S. Brimley, Verdi Burtsch, Virginus H. Chase, J. N. Clark, W. W. Colburn, Willard N. Clute, Fred A. Colby, Francis R. Cope, Jr., Rev. W. L. Dawson, E. A. Everett, W. A. Foxhall, Prof. Angus Gaines, Albert O. Garrett, Benj. T. Gault, Otto Grady, Russell Gray, John H. Flanagan, Esq., Fred Hamlin, Henry C. Higgins, Ned Hollister, Walter Hoxie, Ernest Ingersoll, J. Warren Jacobs, Prof. Lynds Jones, Prof. Ora W. Knight, Gustavus Kohn, Frank H. Lattin, J. Eugene Law, Dr. Walter W. Maires, Dr. Willard L. Maris, C. C. McGinty, E. A. McIlhenny, C. D. McLouth, H. Harvey McNairn, J. C. Mead, John C. Meisky, Harry Edward Miller, H. P. Mitchell, Walton I. Mitchell, C. H. Morrell, Arthur H. Norton, W. A. Oldfield, Rev. William Osburn, Rev. P. B. Peabody, A. L. Pearse, Amos Peifer, Chief Simon Pokagon, W. C. Purdin, James B. Purdy, Calvin L. Rawson, Fritz R. Raymond, Dr. Willet E. Rotzell, James Savage, W. G. Savage, R. P. Sharples, Burk H. Sinclair, Robert Windsor Smith, D. D. Stone, Reuben M. Strong, J. W. Suliot, Arthur T. Wayne, Julius Wendler. To Prof. Jones, Messrs. Jacobs, Smith, Strong, Gault, Baskett, Hollister and Law, especially, I wish to express my appreciation for valuable material and assistance.

FRANK L. BURNS.

Berwyn, Pa., March 1, 1900.

SYNONYMS.

SCIENTIFIC. Polynomials. *Picus varius major alis aureis*, Catesby, "Natural History of Carolina, Florida and the Bahama Islands," Vol. I, plate 18, full size colored figure, 1731.

Cuculus alis deauratis, Klein, "Historiae Avium Prodrömus, cum Praefatione Ordine Anamaliüm," etc., 1750, page 30.

Binomials. *Cuculus auratus*, Linnæus, "Systema Naturæ," 1758, 10th Edition, Vol. I, p. 112.

Picus auratus, Linnæus, "Systema Naturæ," 1766, 12th Edition, Vol. I, p. 174.

Colaptes auratus, Swainson, "Zoological Journal," 1827, Vol. III, p. 353.

Colaptes auratus luteus, Part, Bangs, "Auk," 1898, Vol. XV, p. 117.

Modern nomenclature dates from 1758, when Linnæus introduced what is known as the binomial system, consisting of a generic, followed by a specific term ; hence Catesby's many-worded descriptive name, though the earliest, receives no recognition. The same may be said of Klein who, almost a score of years later, erroneously placed it with the Cuckoos. Linnæus followed his predecessors closely, considering the difference in systems, and to him is given the credit of the specific term ; while to Swainson, erecting a new genus almost a century after Catesby, is given that of the generic term.

According to Coues, *Colaptes* is of Greek derivation, signifying "a chisel, hammer," and *auratus*, "gilden, golden (colored)". More appropriate terms could scarcely have been chosen. Bangs' third term, reducing the northern bird to sub-specific rank, follows to complete the synonymy, illustrating the instability of American nomenclature and the difficulties placed in the way of a study of the literature of a species.

Though the American Ornithologists' Union does not recognize hybrid forms as even sub-species, some of our lead-

ing authorities have at one time or another suggested designations for this peculiar form. Accordingly, as in the case of *C. a. luteus*, I have added such names in the sense of being pure synonyms, which apply equally to *C. cafer*.

Picus ayresii, Part, Audubon, "Birds of North America," 1843, Vol. VII, p. 348.

Colaptes hybridus, Part, Baird, "Pacific Railroad Exploration and Survey Report," 1858, Vol. IX, p. 123.

Picus hybridus, aurato-mexicanus, Part, Sundevall, "Conspectus Avium Picinarum," 1866, p. 72.

Colaptes auratus+*Colaptes cafer*, Coues, "Key to North American Birds," 1872, 1st Edition, p. 198.

Colaptes auratus hybridus, Part, Ridgway, "Nomenclature of North American Birds," 1881, p. 35.

Audubon's type, now deposited in the Philadelphia Academy of Natural Sciences, is a male in breeding plumage, exhibiting the yellow shafts of *auratus* and the red malar stripes of *cafer*, and in the absence of intermediate specimens was thought to have been a good species. Baird found it in all stages of blending in Nebraska, Wyoming, Montana and the Dakotas — principally in the Upper Missouri and Yellowstone river regions — and recognized its true relationship. It is said that at about this time Cassin was inclined to believe that it could be broken up into several distinct species; a belief which he did not act upon, however. Sundevall and Coues adopt forms which are comprehensive, while at the same time somewhat unique. Ridgway admits it as a sub-species. I am informed that in the next edition of Coues' "Key to North American Birds," it was the intention to have it appear as *Colaptes auratus ayresii*, going back to Audubon for the sub-specific term, which Hargitt has already made use of in the British Museum Catalogue, omitting the middle term.

VERNACULAR. Happily our subject escaped the servitude of the prefixed personal name, laid on so many of its class, which in common with names of an indifferent, irrelevant or misleading nature, are the chief obstacles to the acceptance and common use of the official vernacular titles. Names descriptive of form, flight, plumage, notes, habits, habitat, characteristics, etc., or of onomatopoetic origin, are preferable if short and catchy. With its matchless array of marked charac-

teristics, any one of which would well deserve the adoption of a concise descriptive name in a species less excentric, no word in the English language would prove more apt than the one it now possesses—the name given it by the early settlers.

While the compilation of a dictionary of synonyms was not originally contemplated, the vulgar appellations or aliases collected from various sources number 124, all of which have been actually in use, either generally or locally. The probable derivation and meaning, as well as other notes, have been added, when it appeared necessary. Although apparently so varied in character, there is scarcely a name that cannot be placed in one of the three divisions: Descriptive, Onomatopoeic, Misnomers.

Antbird. Minnesota. So called from its well known taste for ants (*Hymenoptera*), of which it devours immense quantities.

Big Sapsucker. Northern States. Misnomer.

Carpintero. Spanish. Obsolete in the United States. Carpenter—the name given to the whole Woodpecker family in Spanish America.

Cave-duc. Maine. Of French Canadian origin. Apparently confounded with the hole-nesting species of horned or eared Owls and continued through ignorance of the original. Along the St. Lawrence river the natives call the horn-owl “cave-duc” or “horn-coot”—Russell Gray.

Clape, Claype. Western New York, Western end of Long Island. Ernest Ingersoll quotes Dr. DeKay as follows: “Said to have been some provincial word introduced by the early English colonists.” In this instance it is doubtless misapplied, as our New York observers unite in the assertion that it is an imitation of the loud spring call note.

Common Flicker. Sometimes used in the East, but more frequently in some sections of the West, where both *auratus* and *cafer* occur.

Cotton-rump. Pennsylvania. From the conspicuous white patch of feathers on the rump. (A similar name—Cotton-tail—has been applied to *C. cafer* in California according to H. R. Taylor).

Crescent-bird. West. From the prominent black crescent on the breast, or the scarlet occipital crescent, or both.

Eastern Flicker. West. Its habitat from a western standpoint.

English Woodpecker. Long Island; Newfoundland. Probably traceable to the early settlers, who doubtless considered it nothing more nor less than a "degenerate offshoot" of a species inhabiting that country.

Fiddler. Cape Cod, Massachusetts. I feel pretty sure that this name is derived from the peculiar sew-saw motions indulged in by the males while courting the females during the early spring months.—Willard N. Clute.

Flicker. This is the most popular and generally used name. Some difference of opinion exists as to the exact derivation of the term, some contending that it is from the song—*wicher* and variations—hence onomatopoeic; while others are just as sure that it must have been suggested by the peculiar twinkling or flickering of the bright shafts when the wings open and close in flight. The latter would commonly suggest the name before the bird had uttered a sound.

Flicker Woodpecker. Middle States.

Flitter. Eastern Pennsylvania. A corruption of Flicker.

French Woodpecker. New Hampshire. Probably derived from the mongrel term, French-pie, which is one of the local names in common use in some parts of England for the Great Spotted Woodpecker (*Picus major*.)

Gaffle Woodpecker. Hudson, Massachusetts. Perhaps a provincial corruption for "gaffer"—a talkative old man.—Frank A. Bates. Or a corruption of "Yaffle," for which see same.

Gallie. Northern New Jersey. Pretty generally so called by the bird-nesting boys.—Willard N. Clute. Evidently an abbreviation of the old English title, "Galley-bird," which, according to Charles Swainson in "Provincial Names of British Birds," is the Sussex name for a woodpecker. The old time supposition was that all of this tribe were doomed to "incessant toil and slavery;" hence the term.

Gel Specht, Gelb Specht. Pennsylvania. German or "Pennsylvania Dutch." Pronounced gail spycht. Yellow Woodpecker.

Golden Sapsucker. Southern New Jersey. Common name in that region.—Dr. Walter W. Maires.

Golden-shafted Flicker, Golden-shafted Woodpecker, Golden-wing, Golden-winged Flicker, Golden-winged Woodpecker, Gold-wing Woodpecker, Golden-wing Woodpecker, Golden-winged Woodpecker. In more or less frequent use, chiefly through the influence of our earlier ornithological writers.

Golden Woodpecker. New York.

Golden-winged Woodcock. Iowa. Misnomer.

Grasshopper Woodpecker. Vermont. From its habit of frequenting open fields where grasshoppers (*Acrididæ*), abound upon which it feeds.

Hairy-wicket, Harry-wicket. New England. Corruption of the love or scythe-whetting notes.

Hammer-Head. Western part of Hampshire county, Massachusetts. This name is equally applicable to any other woodpecker.—W. W. Colburn. A homonym. "Name given in the Cape Colony, Africa, to *Scopus umbretta*, which is allied to the Herons."—Newton's Dictionary of Birds.

Hick-wall. Connecticut. Obsolescent. A relic of the old world, of which Hewel and Hew-hole are said to be corruptions. The older form of which, "Hick-waw" (Holly hand) and Hickway and Highawe (Cotgrave) can hardly have come from anything but the Anglo-Saxon "Higera" or "Higere" (T. Wright), meaning laughter, and doubtless referring to the cry of the Green Woodpecker (*Gecinus viridis*).—Newton's Dictionary of Birds.

High-hole, High-holer, High-hold, High-holder. Northern United States and Canada. "From the usual position of its nest."—Earnest Ingersoll. Further modifications of "Hewel," "Hewhole," "Heigh-hawe," or "High-hawe."—Newton's Dictionary. The terms may have originated in accordance with Newton's statement, but are now used only in the sense defined by Ingersoll.

High-ho Woodpecker. Wisconsin. A contraction of High-hole.

Hittock, Hittocks, Hittuck. Canada. New Jersey. "Said to have been handed down from the Delaware Indians, being the Leni-Lenape word for tree."—Heckwelder. "Probably originated from a fancied resemblance of its notes to the sound of the words."—Alexander Wilson. "So called by the Swedes on account of its notes."—Kalm.

Hivel. New York; Ohio. Origin in doubt. Possibly a corruption of the old English word Hewel, for which see High-hole and Hick-wall; or a contraction of hive-hole, from the buzzing bee-like sounds emitted by the small young in the nest.

Hybrid Flicker. Name given the mixed birds of the West by Baird.

Jaune, Jaune. Louisiana. French. Meaning yellow. The second a corruption of the first.

Le pic aux ailes dorees. Name given by Buffon. French, Golden-winged Woodpecker.

Little Woodchuck. Caloosahatche River Region, Florida. The adjective is used to distinguish the smaller from the "Big Woodchuck" (Ivory-billed Woodpecker).—D. D. Stone.

Meadow Partridge. Wisconsin. Misnomer. From its hurried, Partridge-like manner of flushing from the grass-fields when startled.

Missouri Red-moustached Woodpecker. Audubon's name for the hybrid (*C. ayresii*).

Mo-ning-quana. White Earth Reservation. Chippewa Indians. "Bird with dirty-colored wings."—W. W. Cooke.

Northern Flicker. Prefix given by Outram Bangs to that portion breeding from North Carolina northward.

Ome-tuc. Maine. Probably of Indian and onomatopoeic origin.

On-thee-quan-nor-ow. Hudson Bay Region. British America. Natives. "From the golden color of its shafts and lower sides of wings."—Alexander Wilson.

O-zaw-wan-day Paw-Paw-say. Lower peninsula of Michigan. Pottawatomie Indians. Yellow or Golden-colored Woodpecker.

Partridge Woodpecker. Wisconsin; Massachusetts. See Meadow Partridge.

Paw-Paw-say, plural Paw-Paw-say-og. Lower peninsula of Michigan. Pottawattomie Indians. "Paw-big (flea) hence the word, jumping about quickly in any direction. Our people did not go into varieties nor define birds and mammals as Europeans do. For instance: should we want to describe more particularly the Red-headed Woodpecker, we would say Mis-qud (red)-o-dib (head), Paw-Paw-say (Woodpecker); or

O - zaw - wan - day Paw - Paw - say, (Yellow or Golden - colored Woodpecker).—Simon, Chief of Pokagons.

Peckwood, Peckerwood. Florida, Georgia, Michigan. Transposition of Woodpeck and Woodpecker.

Peerit, Pee-ut. New England. **Pe-up.** Massachusetts. From its shrill call notes.

Pie-bis, Pie-bris. Louisiana. French. Brown Pie or Magpie. A Misnomer.

Pigeon Woodpecker. New England; New York; Minnesota. "Arising from the peculiar pigeon-like attitude when perched across the branch instead of lengthwise along it as do other more genuine woodpeckers."—Ernest Ingersoll.

Pink-throat. Mackinac Island, Michigan. In certain lights the pinkish-cinnemon of the neck appears to advantage.

Picque-bois-jaune. Louisiana. French. Yellow Woodpecker.

Piut, Pi-ute. New England. Same as *Peerit*.

Sapsuck, Sapsucker. Southern States. From the belief that it extracts sap from the trees in which it bores. Misnomer.

Shad-spirit. New England Coast. "A half superstitious idea of the fishermen of former days—and it may be yet—that this bird came up from the south and ascended the rivers just ahead of vernal migration of shad, in order to inform them of the approach of the fish; in other words, a noting of a coincidence."—Ernest Ingersoll. Its spring cry is heard at about the time the first shad are caught in the Merrimac river.—Walter Hoxie. A parallel case in the Old World is that of *Mackerel-bird*, on Guernsey Island, for the Wry-neck, referring to its appearance coincident to that of the Mackerel.

Sharp-billed Flicker. Eastern Pennsylvania.

Silver Dollar Bird. Pennsylvania. "From its white rump mark which it shows so conspicuously when rising from the ground."—W. W. Colburn. According to Gould "Handbook of the Birds of Australia," the Australian name for *Eurystomus pacificus* is Dollar Bird, from the silvery - white spot in the middle of the wing, which is distinctly shown when in flight.

Spotted Woodpecker. Name given by Maynard to the whole genus.

Sucker. Florida. See *Sapsucker*.

Specht, Speckt, Speight, Spright. Pennsylvania. German. (Woodpecker). A corruption—*Woodspite*—is locally in use in England to designate the Green Woodpecker, according to Rev. J. G. Wood.—“Popular Natural History.”

Talpa-na-ni. Southern Florida. Seminole Indians. It has no equivalent in English. The first part seems to be a generic prefix, and the last two syllables are an imitation of a cry of the kind.—Walter Hoxie.

Taping-bird. Massachusetts. This epithet was applied because it flies as if “measured off tape.” In the “Audubon Magazine” an error was made in copying from the “Forest and Stream,” making it “Tapping-bird,” which would of course make it have a very different meaning.—W. W. Colburn.

Tree-pecker. Lower Delaware Valley. (Obsolete). So called by the early Swedish settlers, according to Heckwelder.

Wa-cup. New London and Windham counties, Connecticut. “So called by every one save a few closet bird men.”—C. L. Rawson. Imitation of its song or greeting notes.

Wah-cup. Massachusetts; Long Island. Same as *Wa-cup*.

Wake-up. New England; New York; Minnesota. Corruption of *Wa-cup*.

Wa-wup. New York; Pennsylvania. Same as *Wa-cup*.

Weather-hen. Vermont. Doubtless so called because it becomes, in common with many other species of birds, particularly vociferous just before or after a storm.

Wheeler. Somerset county, Maryland. Probably of onomatopoeitic origin.

Wild Hen. Maine. “Its practice of laying additional eggs when the first set is removed gives the bird this name.”—Ernest Ingersoll. Its cackling notes are somewhat similar to the common domestic fowl’s.

Will Crisson. Dismal Swamp Region, North Carolina. Given me by a gentleman who visited and hunted in that section and heard it applied. I know nothing of its origin or meaning.—W. W. Colburn. Probably another sound-word, corrupted until all trace of the cry represented has been lost.

Woodchuck. Berkshire Hills, Massachusetts; Kansas; North Carolina; Florida. Possibly the suffix is derived from

chuck, the original name for hog ; hence literally *Woodhog*, from its habit of burrowing in the wood in comparison to the rooting of the hog in the earth ; or *chuck*, used in the sense "to strike," would still be consistent ; and again, the latter word with other meanings. "To call as a hen to her chickens, to jeer or laugh," would seem equally relevant and appropriate.

Woodcock. New England; Pennsylvania; Iowa. A homonym rather than a misnomer.

Wood-lark. Locality unknown. Misnomer.

Woodpeck, Woodpecker, Woodpicker. Illinois; North Carolina, Michigan.

Woodpecker Lark. Georgia; South Carolina. "From the black crescent of the breast."—Ernest Ingersoll. Owing to a resemblance in upper plumage as well as the-at-times-similarity of feeding habits and association while on the ground with the Meadow-lark.

Wood Pigeon. New England. Misnomer.

Wood-quoi. Connecticut. A mongrel term, possibly from *Wood-pie*, for which see *French Woodpecker*.

Wood-wall. New England. Clearly an early importation from England, originating from its nesting habits. Said to have been the ancient name for the Green Woodpecker, and occurring in the writings of the old English poets. Still in use in some parts, particularly in the New Forest, Hampshire, according to Cassell.

Xebec. (Pronounced ze-bec). New Hampshire. This is the name under which I received a set of Flicker's eggs some fifteen years ago. The collector knew the species by no other name.—F. H. Lattin. The original of the name is a small sea-going vessel carrying much canvas ; hence the nickname was doubtless suggested by the most conspicuous identity mark of the kind at a distance—the white rump.

Yacker, Yecker, Yucker. New York; Massachusetts. Doubtless of onomatopoeic origin.

Yaffle. Connecticut. Another importation. "The people of Surry and Sussex, England, call the Green Woodpecker 'yaffle' or 'yaffel,' from its repeated notes which are compared to the sound of a laugh."—Cassell.

Yarup, Yar-rup, Yaw-up. Middle States. From its ordinary call note.

Yellow Flicker. West. To distinguish it from the Red-shafted Flicker, whose range it overlaps.

Yellowhammer, Yellerhammer, Yallerhammer, Yellow-'ammer. In general use, ranking next to the Flicker in popularity, more frequently heard in the older States, but not uncommon in the Mississippi Valley, and even cropping out in the far West, thus indicating *C. cafer*. "Yellowhammer is an old Teutonic word, common in Great Britain as the provincial name of the Yellow Bunting (*Emberiza citrinella*). Hammer or 'ammer—it ought to be the latter—means, radically, the chirper, *i. e.*, a small chirping bird, so that Yellow-'ammer=Yellow Songbird. Its application to our Flicker is the result of ignorance long ago."—Ernest Ingersoll. Doubtless the very first settlers, eager to discover something in the wilderness that would remind them of the land they had left, so named the strange bird upon the first flash of yellow, irrespective of the difference in size, structure and habits; and the title continued through a sense of its accidental fitness.

Yellow Jay. New Hampshire, Wisconsin. A misnomer, but not altogether inappropriate, as it possesses a call note almost in common with one of the Blue Jay's.

Yellow-shafted Flicker, Yellow-winged Woodpecker. See Golden-shafted Flicker.

Yellow Wing. Cape Ann, Massachusetts.

Yellow-winged Sapsucker. Pennsylvania. Misnomer.

Yellow-winged Woodcock. Iowa. Misnomer.

Zebec. (*Young Oologist*, '84, p. 22). See Xebec.

GEOGRAPHICAL DISTRIBUTION.

Geographical Range. "Eastern North America; from Florida and the Gulf coast north through the maritime provinces of Canada to Newfoundland and southern Labrador, and the shores of Hudson Bay to about latitude 58° ; thence in a northwesterly direction to Alaska, to about latitude 68° ; west through about the eastern half of Texas, the greater part of Indian Territory, Kansas, eastern half of Nebraska, South and North Dakota, and the province of Assiniboia and Saskatchewan, Dominion of Canada, to northern British Columbia; accidental in Greenland and Europe."—Bendire's Life Histories of North American Birds. Ranging from the sub-tropical climate of southern Florida and the Gulf coast to the tree limits of the boreal zone, it would appear not only pushing out further to the west into the territory of *cafer*, but a foothold which promises to become permanent has been gained in California. While frequently mixed birds, a number of apparently pure *auratus* have been found; the first record being from San Bernardo, taken early in January, 1885."—Auk, Vol. II, p. 383. Mr. R. P. Sharples, during several years' residence in Oakland, Alameda county, has found it and believes it to breed there. He also examined one skin in a small collection in Marin county, and its owner informed him that he had taken it nearby. This is the most direct route for migrants going to or from the northwestern breeding grounds, yet a little over a quarter of a century ago birds exhibiting even traces of the Yellow-shafted, were practically unknown in all that region. There is one record for Colorado. A straggler taken in England in the autumn of 1836 is the only record I have been able to find, though doubtless it has been taken on the Continent also, and a few may and probably do wander into northeastern Siberia.

Winter Range. "It is much more abundant in Winter than in Summer south of latitude 36° , usually inhabiting the

woods and swamps, where it is reported as very wild, keeping well out of the reach of the gun. While it is said to be usually a resident as far north as the 38° parallel, further north it becomes less common, and above the 40° parallel is rather scarce as a resident, although a few are reported at almost every station on the Atlantic slope. "At Cape Cod it is very mischievous during this season, boring holes through the weather boarding of vacant summer residences for no apparent reason except for shelter. Drumming on tin roofs also seems to afford it pleasure."—J. H. Bowles. "At Taunton, Mass., the few that remain find shelter in the deep evergreen swamps or in old ice houses, in which it excavates its winter quarters."—A. C. Bent. "West of the Alleghenies it is found in small flocks on Big Island, Burlington county, Iowa; and is not uncommon at Oberlin, Ohio, Port Sanilac and Plymouth, Mich.; and at Mexico, Mo., extending well out on the prairies, seemingly less migratory yearly, as it was found throughout the cold winter of '93-'94. "At Wady Petra, Ill., for three winters—'93 to '96—an old male was present almost every day, though during the coldest weather he disappeared for as long as a week at a time; during the morning he usually sat on the east side of the roof of the house."—Virginus H. Chase. "At Oberlin College for two winters—'95 to '97—a solitary bird roosted between the vertical water pipe and wall of Spear Library, and during the winter of '97-'98 one bird made its headquarters in the cupola of the Theological Seminary building."—Lynds Jones. Two records are given for Perry, Iowa—Nov. 18, '93, and Dec. 22, '94. Regardless of the Winter weather from one to three have been noticed every few days throughout December, '99, and January, '00, at Hillsboro, Iowa, which is within ten miles of the Missouri border; and at Waseca, Minn., one was seen on Dec. 11 and 12, '86. At Plymouth, Mich., the cold winters and the scarcity or abundance of beech nuts does not seem to effect the rarity or abundance of the Flicker as it does the Red-headed Woodpecker. It does not winter at Glen Ellyn, Ill.; Iowa City, Iowa, or at any station in Wisconsin or Minnesota. While stragglers have wintered even north of the United States in mild seasons, I believe nearly if not quite all birds found above latitude 40° to be Winter visitants from further north,

mainly hardy old males. In this locality it has decreased as a Winter resident during the last fifty years from common to casual.

Breeding Range. Nesting from Newfoundland to the Dakotas and from the Florida peninsula to Alaska, its range is more extensive than that of any other American Woodpecker. It is said to be nearly co-extensive with its geographical range, being found generally below altitudes of 4000 feet. It is in greater abundance and more generally distributed between the 36° and 46° parallels than anywhere else, and in actual numbers probably falls but little short of equalling all other members of the family combined in the same area. It has been found breeding at Fort Churchill, the most northerly outpost of civilized man's residence on the west coast of Hudson Bay. Unfortunately but little data is available from the great northwest, which is doubtless in part owing to its greater abundance in the States. "At St. Vincent, Minn., it is at no time abundant, nor is there an appreciable increase during the autumnal migrations."---Rev. P. B. Peabody. G. G. Cantwell found it breeding in numbers along the Sixty Mile river, N. W. S., on July 8, '97.—Osprey, Vol. II, p. 25. The table given below is compiled from a large amount of published and unpublished data, showing the average period of Summer residence in various sections of the country. It is believed to be approximately correct. The average date of the arrival of the bulk in Maine, while much later than that given for Wisconsin and Minnesota, is taken from thirty-four records; probably a larger number of dates would make it earlier, and consequently show a longer period of summer residence in that section :

LOCALITY.	Av. Date When First Seen.	Av. Date When Common.	Av. Date When Bulk Depart	Av. Date When Last Seen.	Av. Period of Summer Residence.
S. E. Penn'a.....	March 21	April 8	Oct. 9	Oct. 27	189 days.
New York	April 7	" 12	" 3	" 6	174 "
Maine	" 17	" 27	Sept. 26	" 2	152 "
S. W. Penn'a, Ohio, Indiana, Illinois.	March 15	" 3	Oct. 13	" 26	193 "
Iowa	" 22	" 3	" 2	" 25	185 "
Wis. and Minn....	April 5	" 8	" 2	" 9	177 "

MIGRATION.

Exclusive of the work of the United States Biological Survey but little effort has been made in this country toward detailed co-operative investigations on a large scale of this phenomenon ; therefore the finished systematized report produced from the vast mass of accumulated data should be the most important publication ever issued by that branch. We know very little of the migratory habits of the Flicker beyond that it occurs in large loose flocks by night, published data being meagre ; under the circumstances no excuse need be offered for the tabulated forms, incomplete as they are, owing to the varied terms of years, 1875 to 1899, and fragmentary nature of the reports. In spite of all that has been said to the contrary, the homing instinct must have much to do with the annual northward movement and the alleged failure of the food supply has less to do with the retrograde movement than the approach of cold and stormy weather and consequent disappearance of sheltering foliage. In common with a large number of our birds, the Flicker is peculiarly sensitive to meteorological changes which govern its movements to a large extent. The discussion of the probable causes of the semi-annual restlessness and irresistible impulse to move to more favorable climes lies beyond the scope of this paper. If migration consisted of a uniform dispersion and progression throughout the country instead of lines of flight along the coast, rivers and valleys and in irregular waves, the significance of the dates would be more apparent ; as it is, a record may be that of the arrival of a Summer resident or transient, according to the remoteness or proximity to the line of flight. W. W. Cooke in " Bird Migration in the Mississippi Valley," states that the Flicker travels faster on the east than the west side of the Mississippi river. He estimates its average daily speed at about 12 miles. My calculations place the relative speed at about the same figure, but varying according to season

and weather conditions from 7 to 48 miles per night. It is absolutely certain that it does not move steadily night after night, but only as the weather permits or necessitates and its physical condition allows; the actual distance covered in a night's journey is therefore much greater than at first apparent.

Vernal. During January and February it is found in flocks of fifty or more individuals in Charleston, S. C. (Wayne), and the forward movement takes place in the first mild weather; the forerunner appearing at Berwyn as early as Feb. 2 or as late as April 6, according to the promises of the season, correlating in a measure with the date at which the first frog is heard peeping. The first arrivals are often solitary birds, frequently hardy old males, that have wintered nearby, accounting for the irregularity of first appearance.

LOCALITY.	1892	1893	1894	1895	1896	Aver.	No. Yrs.	Earliest	Latest
Berwyn, Pa.	Feb. 25	.....	Mar. 20	Apr. 2	Mar. 30	Mar. 13	10	Feb. 2	Apr. 6
Germantown, Pa. ....	.....	.....	.....	.....	.....	.....	.....	Mar. 13	Mar. 25
Croton Falls, N.Y.	Apr. 4	Apr. 6	Mar. 22	Apr. 6	Apr. 12	Apr. 6	7	Mar. 22	Apr. 14
Cincinnati, N.Y. ....	.....	Apr. 5	.....	Apr. 9	Apr. 14	Apr. 13	6	Apr. 5	Apr. 20
Penn Yan, N. Y.	Apr. 3	Apr. 3	.....	.....	.....	Apr. 8	10	Mar. 21	Apr. 18
Toronto, Ont.	Apr. 21	.....	.....	.....	Apr. 26	.....	.....	.....	.....
Westbrook, Me.	Apr. 6	Apr. 8	.....	Apr. 20	.....	Apr. 12	7	Apr. 4	Apr. 20
Cornish, Me.	Apr. 9	.....	Scarce	Apr. 22	Apr. 15	Apr. 15	5	Apr. 9	Apr. 27
N. Brighton, Me. ....	.....	.....	.....	Apr. 26	Apr. 20	Apr. 21	10	Apr. 12	Apr. 28
Pittsfield, Me.	Apr. 6	Apr. 22	Apr. 18	Apr. 21	Apr. 15	Apr. 18	7	Apr. 6	Apr. 23
Bangor, Me.	Apr. 6	.....	.....	Apr. 20	Apr. 22	.....	.....	.....	.....
Waynesburg, Pa.	Mar. 27	Mar. 25	Mar. 19	Jan. 21	.....	Mar. 2	6	Jan. 21	Mar. 27
Oberlin, O. ....	.....	.....	Mar. 5	Feb. 26	.....	.....	.....	.....	.....
Wady Petra, Ill. ....	.....	.....	Mar. 8	Feb. 28	Feb. 24	Mar. 2	3	Feb. 24	Mar. 8
Glen Ellyn, Ill. ....	.....	Mar. 26	Mar. 25	Apr. 1	Apr. 5	Mar. 29	4	Mar. 25	Apr. 5
Delavan, Wis.	Apr. 2	.....	Mar. 18	Apr. 2	Mar. 31	Mar. 29	4	Mar. 31	Apr. 2
Mt. Sterling, Wis. ....	.....	.....	Mar. 22	Mar. 31	.....	.....	.....	.....	.....
Meridian, Wis. ....	.....	Apr. 3	Apr. 2	Mar. 24	Mar. 20	Apr. 3	6	Mar. 24	Apr. 13
Beatrice, Neb. ....	.....	.....	Feb. 17	Feb. 27	.....	.....	.....	.....	.....
Odell, Neb. ....	.....	.....	Apr. 4	Apr. 20	.....	.....	.....	.....	.....
Iowa City, Iowa ....	.....	.....	Mar. 10	Mar. 4	Mar. 5	Mar. 6	3	.....	.....
Grinnell, Iowa. ....	.....	.....	.....	.....	.....	Mar. 30	6	Feb. 18	Apr. 3
Perry, Iowa. ....	.....	.....	Mar. 19	Apr. 2	.....	.....	.....	.....	.....
Waseca, Minn.	Apr. 3	Mar. 28	.....	.....	.....	Apr. 2	12	Mar. 21	Apr. 9

Narbeth, Pa., March 20-25; Vincennes, Ind., about March 9; Forest City, Ia., Feb. 14 ('91); Dawson, Y. T., May 22 ('99).

The condition of the weather has much to do with the irregularity, as it has been observed that of the earlier records those of January and February especially were made in mild open weather, while the latter dates with one exception were made after a season of irregular weather; March '93, however, was generally open and mild, yet it did not put in appearance until the 25th; the next day more arrived, and in a

few days it became common. It returns each succeeding year to the same locality (Jacobs). It often makes its first appearance at Iowa City, Iowa, in small flocks; at Delavan, Wis., in pairs or small bunches, and at Meridian, Wis., often in quite large flocks, at other times in pairs or families.

The bulk ordinarily arrives between two and three weeks later, in Pennsylvania and Illinois, but the number of days intervening gradually diminishes as it moves northward, and the van leads by scarcely a week in the northern tier of states. As far as I have observed, the males appear before the females, and the migrations are conducted in small companies, these forming the bulk of transients; while like most all species migrating, there are forerunners and stragglers (Miller). At Berwyn, Pa., it becomes common soon after the hardy willow has unfolded its leaves, and about the time the fragrant spice-wood blossoms, when the ants, spiders and beetles become active once more, and just in the height of the arbutus season. It appears to average earlier in the West than in the same latitude in the East.

LOCALITY.	1892	1893	1894	1895	1896	Aver.	No. Yrs.	Earliest	Latest
Columbia, Pa.	Apr. 1	Apr. 10
Berwyn, Pa.	Apr. 1	Apr. 20	Apr. 12	Apr. 1	11	Feb. 27	Apr. 23
Penn Yan, N. Y.	Apr. 18	3	Apr. 17	Apr. 19
Cincinnati, N.Y.	Apr. 9	.....	Apr. 20	.....	.....	.....	.....	.....
Buffalo, N. Y.	Apr. 10	Apr. 20
Westbrook, Me.	Apr. 21	Apr. 24	Apr. 22	.....	Apr. 18	Apr. 20	7	Apr. 18	Apr. 24
Cornish, Me.	Rare	Rare	Apr. 19	.....	.....	.....	.....
N. Brighton, Me.	Apr. 22	Apr. 20	Apr. 21	10	Apr. 12	Apr. 28
Pittsfield, Me.	May 1	May 1	Apr. 28	May 1	Apr. 29	Apr. 29	7	Apr. 23	May 1
Waynesburg, Pa.	Apr. 1	.....	.....	.....	Mar. 18	.....	3	Mar. 12	Apr. 10
Oberlin, O.	Mar. 9	Apr. 5	Apr. 11	Mar. 21	6	Mar. 9	Apr. 11
Wady Petra, Ill.	Apr. 6	Apr. 3	.....	.....	.....	.....	.....
Glen Ellyn, Ill.	Apr. 2	Mar. 25	Apr. 14	Apr. 12	Apr. 9	7	Mar. 25	Apr. 19
Delavan, Wis.	Mar. 21	Apr. 5	Apr. 2	Mar. 30	3	Mar. 21	Apr. 5
Mt. Sterling, Wis.	Apr. 13	Apr. 2	.....	.....	.....	.....
Beatrice, Neb.	Apr. 13	Mar. 20	.....	.....	.....	Mar. 20	Apr. 13
Grinnell, Iowa.	Mar. 28	5	Mar. 19	Apr. 3
Perry, Iowa.	Mar. 30	.....	.....	.....	.....	.....
Waseca, Minn.	Apr. 15	May 1	.....	.....	Apr. 11	6	Mar. 26	May 1

Boothby Harbor, Me., April 10 ('98); Vincennes, Ind., about the middle of March; Red Wing, Minn., last of March or first of April; Ramsey, Hennepin, Dakota and Washington counties, Minn., last of March to April 10. It is found sparingly during the Winter at Hillsboro, Ia. Feb. 24, '99, it began to increase, March 15th the great wave appeared, April 2, all gone except the goodly number that remain to breed. April 17, '98, when some twelve or fifteen miles off Cape Ann, at sea, a Flicker came aboard, perching for a few minutes on

the top sail before continuing its northerly course (Morrell). As numerous as and even more noisy than the Robins, during migrations, calling uneasily, flying from tree to tree, often in considerable companies. It is not confined to the woods, but is everywhere. This vast multitude passes northward within a week after arrival, leaving only the local breeders (Jones). Some notes taken in the Spring of '96 at Delavan, Wis., by Mr. Ned Hollister are interesting on account of the waves recorded; March 31, first heard at daybreak, calling loudly from the heavily wooded island in Delavan lake; five seen during the day in a walk over this island, all low down near underbrush between wood and marsh; April 1, about the same number in same place; April 2, common about lake; April 4, common everywhere around the shores, having steadily increased since first arrivals; in the morning, soon after the first signs of daybreak, it was heard calling from all sides. On moving into town none were observed until the 12th, when it became very abundant all at once, a perfect wave taking the place of a very large wave of Yellow-bellied Sapsuckers that had taken the town by storm the two previous days. The Flickers were everywhere, especially in the marshes, orchards and woodland; burnt marshes seem to be a favorite place, feeding on the ground in dozens and large flocks, far from water. April 19, 20 and 25, abundant; April 28, 29, common; April 30, abundant; after this date common until Fall.

During the season of 1895 there was a marked decrease in numbers in some localities: for instance, at Columbia and Berwyn, Pa., it became rather uncommon, and at Cornish, Me., from abundant to quite rare, none remaining to breed. At only one point was it particularly noticeable in the West, about Meridian, Wis., where the decrease was placed at 50 per cent at least. It seems almost incredible that so hardy and resourceful a bird should have suffered so severely from that long-to-be-remembered blizzard.

While the retrograde movements are conducted in larger numbers, being recruited by great numbers of birds of the year, it is scarcely as noticeable, lacking the noise and bustle of Spring arrivals. Like the Robin, its whole nature seems to have undergone a change. It no longer solicits notice by song or display of plumage, but becomes shy and suspicious,

and while gregarious to a great extent, in flight every one is capable of looking out for itself. The mature birds are the most wary, and by example prepare the young for the dangers of migration and Winter residence in the South, where it is constantly menaced by hunters. Acknowledging the difficulties in the way, it seems to me that the departure of the bulk has been sadly neglected nevertheless. In this species at least its value over dates of last seen is apparent.

LOCALITY.	1893	1894	1895	1896	Average	No. Yr's	Earliest	Latest
Berwyn, Pa.	Oct. 19	Oct. 19	Oct. 5	Sept. 6	Oct. 9	7	Sept. 13	Oct. 19
Oberlin, O.				Nov. 10	Nov. 14	4	Nov. 1	Dec. 6
Glen Ellyn, Ill. .	Sept. 20	Sept. 25	Sept. 26	Sept. 20	Sept. 25	7	Sept. 20	Sept. 28
Delavan, Wis. . .	" 12	Oct. 7			Oct. 1	3	" 12	Oct. 12

At Buffalo, N. Y., the bulk retires in October; Dunrak, Pa., first week in October; Meridian, Wis., by Oct. 10; and the same date is given for Hillsboro, Ia. The departure of the bulk is always dependent upon weather and foliage. In '98 the foliage was unusually late in falling, but in '99 rather unusually early with some chilly weather in October (Jones). During the cold windy days in October at Taunton, Mass., it may be found in large numbers huddled together in hollows and sheltered localities, where it may be easily approached (Bent). The last seen are represented by a number of irregular dates.

LOCALITY.	1892	1893	1894	1895	1896	Aver.	No. Yrs.	Earliest	Latest
Bangor, Me.				Sept. 28					Oct. 21
Pittsfield, Me. .		Sept. 30		Sept. 29	Sept. 9	Sept. 27	5	Sept. 9	Oct. 6
Westbrook, Me. .	Sept. 19				Oct. 11	Oct. 11	4	Sept. 14	Nov. 28
Toronto, Ont. . .	Oct. 4	Oct. 11	none		Oct. 1	Oct. 2	5	Sept. 25	Oct. 11
Cinnatus, N.Y. .	Oct. 6								
Penn Yan, N. Y. .									Dec. 29
Croton Falls, N.Y.	Oct. 4	Oct. 11	not seen			Nov. 4	3	Sept. 26	Oct. 11
Berwyn, Pa.		Oct. 19	Oct. 19		Nov. 12	Nov. 12	6	Oct. 19	Dec. 8
Waynesburg, Pa. .								Nov. 10	Dec. 10
Delavan, Wis. . .	Sept. 27	Sept. 19	Oct. 19	Oct. 18			4	Sept. 19	Oct. 18
Wady Petra, Ill. .			Oct. 15	Oct. 21					
Perry, Iowa.		Nov. 18	Dec. 22	Sept. 4					
Grinnell, Iowa . .						Oct. 22	5	Oct. 5	Nov. 21

At Croton Falls, N. Y., not present during the fall of '91 and '94; Dunrak, Pa., last by October 15; Germantown and Narberth, Pa., by last of October; St. Paul, Minn., late in October, one lingering until November 7, '95; Iowa City, Iowa, and Glen Ellyn, Ill., last week in October; Hillsboro, Iowa, November 6, '99, all but the few that winter.

FLIGHT.

Its usual flight is undulating, so characteristic of the Woodpecker family as well as the Crossbills, many of our Finches and some other species. While gaining headway its wings beat the air rapidly, producing a whistling sound which, upon gaining sufficient altitude and velocity, apparently ceases altogether, recurring only when about to alight. Perhaps this noise is only an audible manifestation of its almost perpetual bustle and restlessness, as I have known it upon rare occasions to take flight or alight within a few feet of me with the stealth and noiselessness of an Owl. When flying in flocks, which by the way are never compact, it does not act with the unity of action of the majority of our birds; still there is considerable regularity of length and inflection of the waves produced by the alternate opening and closing of the wings. During '96 I took the following notes: June 25, one flushed at road-side, rose twenty feet at a distance of seventy-five feet—just clearing the comb of a small barn—making five dips of about three feet or one dip every fifteen feet on an average. One flushed from creek bank and flew to ground again. Ten feet rise in forty feet, making two dips of less than one-half foot. August 1, several flushed from ground. Ten feet rise in forty feet, two dips of about three feet or one dip every twenty feet. It is capable of greatly increasing its usual speed and sustaining itself with little or no undulation but seldom rising to any great height above the tree tops except when migrating. Alighting is best accomplished by a slightly upward movement, and when at right angles to its perch the tail plays an important part in the rather awkward feat of balancing, suggesting a comparatively recent acquirement and one not attained by the true Woodpeckers.

ROOSTING.

I do not know how much proof can be offered in support of the popular belief that it habitually roosts in the tree cavities. While it is to be inferred that it frequently does so in cold or stormy weather whenever suitable chambers are available, yet I very much doubt whether accommodations could be found within reasonable distances for more than five per cent. of the number flocking previous to the autumnal migrations as well as the winter season in the south. During the warm summer months it is reasonable to suppose that it would prefer the open air to the hot and stuffy chamber of wood, except of course the short period necessary to hatch and protect callow young.

Alexander Wilson relates how a captive slept in a perpendicular position with its head under its wing. An interesting observation comes from Mexico, Missouri: On a cold blustery evening of the spring of '94, a Flicker was observed roosting on the south-west side of the bare trunk of an elm close to the house. The year following, on the warm and balmy evening of April 9th, another bird flew into the same elm and with a little scrambling and investigation it disappeared behind the trunk to a niche a little below the crotch of two upright limbs, with its whole body in contact with the bark of the tree and its neck shortened back into its body—it was evidently in a roosting position. Now as it was not known whether the previous visitor had staid all night, this one was carefully and perhaps too closely watched, as it left at the call of a passing mate. The next night was cooler with a north-east wind and a lowering misty vapor in the west, but not very threatening. At 6:30 the same or another female alighted and quietly shuffled around on the south side to the identical spot occupied for a time the previous evening, but at 7 o'clock it too had vanished.—J. Newton Baskett. Bendire quotes a Maine correspondent who once found a Flicker asleep on the outside of

a tree one moon-light night ; as there was no bird on the nest, it roosted in that position from choice. At Oberlin College a single bird roosted between the vertical water pipe and wall of Spear Library for two successive winters, and another occupied the cupola of the Theological Seminary the succeeding winter. —Prof. Lynds Jones. A correspondant makes note of it cutting its way through weather boarding of vacant summer residences at Cape Cod for no apparent reason except for shelter, and at Taunton seeking shelter in the deep evergreen swamps or excavating winter quarters in the sawdust lining of ice houses. It has also been known to roost in hollow trees, outbuildings about farm houses and unused chimneys during the coldest seasons.

DRUM CALLS.

This form of instrumental music is a by no means insignificant addition to the Flicker's repertoire. It is a musical long roll of vibrant, far reaching effect, sometimes evidently demanding an answer as the bird will assume a listening attitude, and at other times preceeding or succeeding a vocal call or song. In the spring time it is a very popular means of attracting the attention of a mate or sounding an assembly. It is seldom heard after the nesting season has well progressed and ends before the young have hatched. J. N. Baskett states that in drumming the beak is struck directly end-on against the resonant body as shown by an examination of a soft pine box which was frequently used. The box was nailed to a tree and by slipping up and throwing a hat over the bird while it was clattering away, it was finally caught. Either it or another one was drumming again the next day. Chief Simon Pokagon relates a little incident which must not be lost. In his own words: "I asked a class of Indian boys what kind of music they liked best. One said '*Pe-nay-shen*' (Bird) music. I then asked each one what kind they liked best of all the birds. One replied '*Au-pe-tahe*' (Robin), another '*Tehindees*' (Blue Jay), another '*Au-nawk*' (Thrasher), another '*We-bin-gwan-Pe-ney-shen*' (Bluebird), and to the smallest in the class I said '*Que-we-zaynes*' (My boy) 'what one pleases you the best?' He quickly replied '*O-zaw-wan-day Paw-Paw-say*' (Golden-winged Woodpecker). I said 'Why so my little boy?' He quickly answered 'Oh him am such a *me-no* (good) *Tom-mer Tom-mer* (drummer.)' Accent almost invariably on last syllable."

VOICE.

The Flicker has a much greater vocabulary and more modes of expression than any other of our North American Woodpeckers, and while the contrast between its so-called song and the inspiring melody of our tree songsters is ever so great, its voice blends harmoniously with the many other voices and sounds of nature without which the hill, meadow and grove would lose much of their charms. Individuality now and then cropping out during and immediately after mating and the earlier part of the breeding season, appearing to be constantly varying and improving, seeking to give expression to its feelings.

Perhaps it is unwise to devote much space to this subject however enticing it may be, for but few have given enough time and thought to it to be classed as competent reporters; then the variability of the notes according to locality adds another difficulty. However, as its notoriety has been largely gained through its versatile voice, it would not do to pass over this fascinating study without an attempt to condense and render intelligible the notes in my possession. For brevity and convenience I have separated them under Calls, Conversational Notes, Common, Scythe-whetting, Flicker and Wake-up Songs.

Calls. The vocal call is usually high pitched and penetrating. It is a note characteristic of no particular season and when uttered in a startling shriek which may be heard at a distance of almost half a mile or subdued to a soft but impatient inquiry unnoticed a hundred yards away, it serves as a call or answer to comrade, mate or young, challenge to rival, or precedes the song as an imperative demand for attention. Ordinarily a *chu*, *ka*, *che-u che-ah*, or *chu-ah* in New York and Pennsylvania, and in the northern part of the first state often sounding like *clape* and *kee-yer*. In New England—*pea-up*, *ye-up*, *ye-a-up*, *yar-r-r-up*, *pee-up*, *kru* and *que-ah*. In Georgia

—*wake-up*. Missouri—*cheer*. Illinois—*flicker*. Iowa—*keel'-yer*. There are evidently answers to all calls and it is a question whether one sex has a note not possessed by the other.—J. Newton Baskett. During a calm day it may be heard calling *clape* nearly a mile to windward.—H. E. Miller.

Conversational or Soliloquizing Notes. These are neither calls nor songs and are evidently not intended for the ears of the public, commonly a scanny, gurgling, almost involuntary *chur-r-r-r* as danger seems to threaten it when on the wing, or when flushed from the ground or just before a-lighting, which may be interpreted as a note of warning or announcement of arrival according to the circumstances. I have heard a low guttural *who-del* as it endeavored to balance itself on a slender branch immediately after arrival. At Wady Petra, Illinois, an old male who spent three successive winters close at hand, usually sat on the house roof for a time in the early morning. On December 1st, '94, he uttered an odd guttural call of *huck-a-woo'-ah* or again only *woo woo* evidently for his own edification.—Virginius H. Chase. At Croton Falls, New York, a low and soft *a-claupee* belongs exclusively to the nesting season.—H. E. Miller. From Ponkapog, Mass., we have another note: On September 12, '94, an adult and four young flew on a tree overhead, uttering a soft measured *sic-err* several times. While making these notes they seemed to be in a sort of ecstasy, holding the limb firmly, spreading their tails, drooping their wings, stretching their necks, pointing their beaks upward and throwing their heads this way and that in a quick, graceful manner, keeping perfect time to the notes.—J. H. Bowles.

Common or Cackling Song. This undergoes but few modifications, being a simple *ka* or *cuh* repeated more or less rapidly from six to thirty-five or more times in a loud full voice, rising and falling regularly as the notes are inhaled or exhaled. To correspondents in Massachusetts and Michigan its song sounds like *wet-wet-wet*, while to others in the former state it is *yip-a-yip* or *woit-a-woit*, and in Iowa *hee-chu*, repeated over and over again. Its song reminds me of that occasionally emitted from the throat of our common domestic hen, although the latter is a tame and feeble imitation in comparison. It begins in Southern Pennsylvania on the first

mild day in March and increasing in length, frequency and rapidity as the season progresses, with intervals of depression during cold or stormy weather, until about April 10th when it becomes monotonous, the notes often being uttered at the rate of four or five to the second ; this continues until about the 20th, after which it becomes infrequent, much shorter and rather subdued in tone, until nest building, incubation and care of young claim its undivided attention and the song is restricted as much from caution as from any thing else, it is only semi-occasional until late in June when the young are well along ; it revives once more for a few days in a brief early morning—5:30 to 7:15—or before or after shower song. As a cooler day appears in August or September it becomes more frequent and even lively, especially after a refreshing shower, but by the first week in October is heard no more. A careful observer at Perry and Madison, Wisconsin, has arrived at about the same conclusion, i. e., it begins the cackling song in the country previous to the towns, is more clamorous in the morning and evening, almost ceasing after it becomes well mated, and cropping out again in the months of August and September.—J. Eugene Law.

Love or Breeding Songs. The last three songs are essentially of this character. I am aware that some are mating notes only while the active breeding season claims others exclusively, yet I am unable to make such separation. The **Scythe-whetting or Rollicking Song** is probably a form of greeting as well as love, as it is uttered when two or more meet. It has been likened to the sound produced by the sharpening of a scythe, and is a sharp metallic *wich-er, wich-ah, wick-ah, wee-chee, ka-wick, or co-flick* of the New England and Middle States ; *quit-to* and *quit-tu*, of Ohio ; *hurrick-ah*, of Minnesota ; *tse-wet* and *chuck-a-chuck*, of Iowa, repeated from two to twelve times. The **Flicker Song** is so hopelessly entangled and interwoven with the **Scythe-whetting Song** as hardly worth recognizing as separate when all the localities are taken into consideration. The **Wake-up Song** is less frequently uttered, and is the same throughout the north, from Maine to Iowa, as an oft-repeated *wake-up, wa-cup, we-cup, we-cough, wick-up, wick-ah, or hick-up*, and in Georgia *chuck-up* ; great emphasis being laid on one or the other syllables, usually the first. I regard

I APPEND TABLES IN ORDER THAT THE READER MAY OBSERVE THE PROGRESS AND DURATION OF THE
 SONG PERIOD AS WELL AS CORRELATIVE DATA FOR NEARLY TWO SEASONS AT
 BERWYN, CHESTER COUNTY, PENNSYLVANIA.

DATE.	NO. OF BIRDS.	WEATHER CONDITIONS.	COMMON SONG.	OTHER SONGS, CALLS, ETC.
1897				
March 22-3	3-5	Warm and cloudy.	Occasional, 6 to 10 notes duration.	Several drum calls.
" 26	2	Cold N. W. wind.	Throughout day. Not more than 6 notes	Call at 2 P. M. Drum call at 6 P. M.
" 30	6	Very warm. Fair.	Frequent 6 to 10 notes duration.	Several drum calls.
" 31	2	Warm, fair, brisk N. E. winds.	A trifle longer during day.	" "
April 2	2	Warm, fair, wind N. shifting E.	8-12 notes repeated slowly.	" "
" 3	4	Warm, fair, wind East.	Loud, long, rapid and frequent. 12-35 notes.	<i>Wicker</i> twice in succession. One or two calls.
" 4	8	Cloudy, mild, rain at 4 P. M.	Loud, long, rapid and frequent. 25-35 notes.	Two calls. Frequent drum calls.
" 5	8	Rain until 10 A. M. Fair until 6 P. M.	Short and infrequent.	
" 6-7	2-2	Cloudy, some rain, cooler.	Longer and faster. 12-20 notes	
" 8	4	Cloudy, rain from 1 P. M. to night.	Short.	
" 9-11	2	Rain and fog or fair and cool.	Louder and longer (P. M.)	
" 12	2	Cloudy A. M. Fair P. M.	Much longer.	<i>Wick-up</i> frequent at 3 P. M.
" 13	2	Rain, cloudy.	Frequent. Monotonous.	<i>Wang, wick-up</i> and <i>wicker</i> common.
" 15	18	Fair, mild.	Frequent. Very long.	<i>Wick-up</i> frequent. Calls common.
" 16	9	Fair, warm.	Once in A. M. Frequent in P. M.	<i>Wick-up</i> several times.
" 18	7	Freezing A. M. Very warm P. M.	Shorter and fainter.	Probably excavating nests.
" 20			Renewed, long and lively.	Probably incubating.
" 21-26		Fair and mild.	Occasional, neither loud nor long.	
May 1-10	5		Increasing in force and length.	
" 11			Occasional early A. M. or before or after rain.	
" 12-26			An increase.	Probably young well along.
" 27-31			Frequent.	<i>Wick-up</i> once. Several calls.
June 10	8	Fair. North breeze.	Infrequent.	
" 12-25			Infrequent. Short duration.	
July 4-9			Short and broken, before 8 A. M. after 5:30 P. M.	
" 11-17			One short song.	
" 19-20				
August 1, 3, 16.				Short <i>wicker</i> song.

THE FLICKER.

29

DATE.	NO. OF BIRDS.	WEATHER CONDITIONS.	COMMON SONGS.	OTHER SONGS, CALLS, ETC.
1898				
February 10, 13	1-1	Fair, mild	At 7 A. M. 6-8 notes duration.	Calls
March 16	1	Cloudy, mild	At 10 to 11 A. M. 6-10 notes after rain.	
" 21	2	Rain, cooler	4 to 8 notes duration.	
" 21	3	Threatening, warm	All day, 6-12 notes, once 28 notes.	Calls
" 27	10	Cloudy, warm	8 to 12 notes duration.	<i>Ka-wick</i> and <i>kick-up</i> songs, calls and drums.
" 30	4	Cloudy, mild	Short and few.	Calls and drums.
April 3	2	Cloudy, cold	" "	Short <i>Ker-wick</i> 4 P. M. Calls.
" 8	1	Cold and blustry	" "	Few calls.
" 9	3	Fair, mild	More frequent, 8-20 notes.	
" 10	1	Mild, showery	More frequent, 12-22 notes.	
" 11	4	Mild, cloudy	Frequent, 12-24 notes.	
" 12-13	2	Fair, warm	Frequent, 16-24 notes.	<i>Wick-up</i> song.
" 14	2	Mild, raining at 4 P. M.	Short duration.	
" 15	1	Cold and windy	Frequent, 12-20 notes.	Calls
" 17	6	Fair, windy	Frequent, 10-24 notes.	Much drumming between mates.
" 18	9	" "	Infrequent.	Much drumming. Nearly all appear mated.
" 19	2	Cold, showery.	Common at any time, 16-32 notes.	Drum calls
" 20	12	Cold, windy	Less frequent.	<i>Wicker</i> and <i>wick-cough</i> notes. Long drums.
" 21	14	Showers and squalls	Common, 20-30 notes.	Several <i>wick-up</i> songs. Drum calls.
" 22	10	Mild, cloudy	Frequent.	Frequent <i>wick-up</i> songs. Much drumming.
" 26	5	" "	Short or silent.	<i>Ka-wick</i> and <i>wick-ka</i> song at 6 a. m.
May 1-14			Frequent.	Silent except occasional call
" 18, 23, 27			Not frequent.	
" 28-31			Occasional, short duration.	
June 1-8, 17, 28				

this song as by far the most musical of any of its attempts in this line. On May 16, '96, I heard an apparently rare variation, a metallic *ka-wick-wick-wick-wick-wick-wick-wick-wick-wick-wick-ka* by the male while close to the nest.

Quite a number of birds have certain cries which might easily be mistaken for the Flicker's notes. Bendire and others mention the following: Groove-billed Ani, *Crotophaga ani*, Yellow-billed Cuckoo, *Coccyzus americanus*, Pileated Woodpecker, *Geophlæus pileatus*, Blue Jay, *Cyanocitta cristata*, Long-crested Jay, *C. stelleri macrolopha*, and Oberholser in "**Birds of Wayne County, Ohio,**" states that the imitation by the Cardinal, *Cardinalis cardinalis*, was so perfect as to almost induce an erroneous note book entry.

MATING.

Immediately after the arrival of a sufficient number of local birds, (the females appearing last), and the advent of milder days, courtship commences and continues with increasing vigor for two or three weeks. It is elaborate and ceremonious, often bordering the amusing and ridiculous. The male alights close to the female, often choosing a rather slender and leafless horizontal branch as best suited to an unobstructed view of his graceful form and gay plumage. The female assumes indifference or the silence, dignity and alertness of a critic, while the male bowing, hopping, prancing, dancing, strutting, flirting his wings, pleads and urges his suit with flickering, wacuping and hickcuping notes; finally he sidles up to her, she coyly sidles away, and perhaps takes wing, followed by the one or more suitors to another tree, where the whole performance is repeated. There are sometimes from two to five males, between whom sharp but apparently harmless encounters occasionally take place while in the air, determining, as one correspondent suggests, which one shall next offer his attentions. In due time the female shows her preference, and not infrequently joins in with the bowing and singing of her accepted lover, and if the rejected suitors have not already left in pursuit of some other unmated female, the pair unite in driving them from the premises. As Audubon has stated that the Flicker never fights, it is befitting that we insert some of the testimony at hand: I have not observed the males fighting among themselves for possession of the females, but they display a good deal of friendly rivalry in their efforts to display their good points and in paying attention to the desired females.—Angus Gaines. It is only when approaching the female that the male gives utterance to the familiar and highly sentimental *chuck-a-chuck-a-chuck*, etc., all the while sidling up to her as she sidles away. I have seen the pair make the circuit of a tree several times. It is rare that a rival male molests the actor until the

female takes flight, and then he at once pounces upon him.—Lynds Jones. That the males do not always conduct the courtship is proven by Mr. Benj. T. Gault's experience while collecting in the sunken lands of Arkansas and Missouri—the St. Francis river region. He says: On March 3rd, '94, while visiting Griffin island, on the Arkansas side of the river, my attention was drawn to a small troop of these birds, four in number, clustered together near the top of a dead snag. As other birds were interesting me at the time, slight attention was given to them, but on returning to the same spot an hour or so afterwards, and finding them still there, my glasses were turned upon them somewhat to my surprise the lot, consisted of three females and one male, the latter holding the most exalted position on the snag, the evident pride of the gentler sex, who were indulging in quite an animated discussion, idolizing his lordship—so to speak—but in tones so low they were scarcely audible from where I stood. I more than judged their earnest intentions by the peculiar swaying motions of their heads, which were very amusing to witness. Never having seen the female do the waiting upon before or since that time, I think their actions were a little out of the ordinary. J. N. Baskett describes a similar scene of two females courting a male, in the *Osprey*. These are the only instances on record, I believe.

When mated the birds become very affectionate and inseparable, few of our native birds excelling them in this respect. It is constantly calling or answering, the male drumming a long rolling call and singing the common song at the top of his voice to equal or excell that of his nearest neighbor; when suddenly missing the female, his calls amount to a perfect shriek, and an answer results in a swift galloping flight as he gurgles a scanny exclamation; alighting beside her he indulges in a series of bows and *we-cup* notes, in which she joins for a time. As the more serious side of life begins, the selection and construction of a nesting place, he becomes less and less noisy, and finally almost silent altogether, except the early morning and before or after shower song, although fully as attentive and helpful to his mate as ever.

NIDIFICATION.

Situation of Nest.—I fail to discover any great uniformity in the choice of nesting places throughout its breeding range, which is not surprising, considering the well known capabilities of the bird for adapting itself to existing conditions, and which indeed is absolutely essential in a species so abundant numerically and ranging over so wide and diversified a territory. On Avery's Island, La., it seems to prefer trees near the edge of the woods, occasionally close to water or in yards or pastures. In the South Atlantic States the lowland pine forests, usually a dead pine, now and then an oak, apple, maple, chinaberry, ash, beech, willow, palmetto, or an unrecognizable stub. Mr. W. L. Foxhall calls to mind one dead pine, perforated with 25 or 30 holes, most of which were in use at one time or another. In the Middle and Eastern States: apple, sycamore, oak, butternut, cherry, elm, chestnut, maple, poplar, beech, ash, pine, hickory, etc. In Southwestern Pennsylvania Mr. J. Warren Jacobs has found the choice to be about as follows: 1st, along streams and in orchards; 2nd, pasture fields on hillsides; 3rd, in woods. He has also found the sycamore to be the favorite, with the apple and maple second, the beech and locust third, oak and cherry fourth, and all other varieties fifth. At Croton Falls, N. Y., it appears to have no marked preference, as it is found in the low wet meadows and again in the highest and driest woodland, the fruit trees in orchards and the willows bordering the water appear favorites; while about Cincinnati and Buffalo the edge of woods, groves, orchards or isolated trees, always in dead wood, have their claims. Mr. C. L. Rawson used to fancy that it preferred apple trees at Norwich, Conn., but old orchards disappear and no particular tree now seems to be the favorite. At Fitchville a row of old elms are now the homes of half a dozen Wacups. At Taunton, Mass., it selects perfectly sound apple trees, occasionally an ash, oak or walnut in an open field;

while about Ponkapog it breeds in orchards, swamps, thinly or densely wooded ground, with only one instance of a living evergreen, but any other tree living or dead. At Cornish Me., all found in trees standing away from the thick woods, mostly apple orchards; and about Pittsfield, almost any locality, except perhaps the deeper woods, along the shores of the ponds, especially in overflowed ash swamps it is found. From Ohio westward the apple orchard is a favorite with the poplar, willow, maple, oak, elm, walnut, cottonwood, etc., more or less resorted to, according to availability. Mr. R. M. Strong states that, like many other species, it is rapidly adapting itself to civilization, and gives an instance of a bird excavating a nest about five feet up in the trunk of a shade tree standing on one of the most traveled streets of Oberlin, Ohio. At Glen Ellyn, Ill., Mr. Benj. T. Gault has found that in addition to old and neglected orchard trees, old and partly decayed white oaks, black jacks, and both dead and living elms and poplar are usually selected. At Iowa City, Ia. Mr. Paul Bartsch says that while orchards are the favorite, at times it seeks a more lofty location, such as is afforded by the bare approaches of that giant of the forest, the sycamore; and at Grinnell the favorite trees are the box elder, linden, soft maple, cottonwood, white willow, poplar, in the order named, and in fact almost any tree if it is sufficiently decayed to be easily worked. Summing up the evidence, it is found to be an inhabitant of the open country rather than the deep woods in the north and west.

The preceding may be called the natural nesting sites, but at the same time does not complete the list of available situations for this remarkable bird. Gate posts, fence posts, telegraph, telephone and electric light posts are frequently utilized on the treeless islands and beaches of the east as well as the prairies of the west. Mr. J. H. Bowles writes that on Cape Cod large numbers of poles are literally honeycombed with holes, some of which are used for nesting purposes. It has been found breeding far out on the prairie in an old wagon hub, surrounded by weeds; also in barrels, and one instance of an excavation of the regulation size in a hay stack is on record; another nested in a crevice of an unused chimney for several years; and stranger yet it has been found more than

once occupying Kingfisher's and enlarged Bank Swallow's burrows. It often cuts through the weather boarding of ice-houses, and burrowing in the sawdust lining, lays its eggs, as well as utilizing for the same purpose enclosed cornices, gables, hollow columns, etc., of dwellings and other buildings; not uncommonly in the east and quite frequently in the west. Mr. G. F. Breninger gave an account of the Flicker cutting holes in a 65-foot church tower at Beattie, Kans., and building on the timbers within, six pairs bringing forth young. In response to an inquiry he has given me fuller particulars. The holes were cut through the shingles near the top of the tower and the eggs deposited on the timbers within. The orifice being so small as not to admit of even a small boy getting at them, it was impossible to ascertain whether any cavity was dug into the timber or any material used for nests. He has observed the same trait carried into effect by the California Woodpecker in a church tower at Oreville, Cal. Rev. P. B. Peabody gives some interesting data, showing how it modifies its habits when resorting to localities where the usual nesting conditions are well nigh impossible. In Southwestern Minnesota, where there is very little timber in which it could nest, it has been found resorting quite commonly to the telegraph poles and the railway semaphores. One semaphore contained five holes, one of which was inhabited by a pair of Flickers, and another, just above it, by a pair of Tree Swallows at the time of observation. The holes in the telegraph poles appear very shallow, and generally at a height of not less than two or more than ten feet. Up in northern Minnesota the occupancy of the telegraph poles is quite common and the occupancy of buildings even commoner. For instance, the Church of St. Vincent has Flicker holes in the cornice of both gables. Last year it made a new excavation in the north gable while the Tree Swallows took possession of the south gable. The ice-houses of the Great Northern railroad are perforated with holes, as many as eight in the south end, which is very small. From Ottawa, Kans., comes the particulars of an almost unique nesting site. Mr. Burke H. Sinclair found a nest containing eggs in the garret of the town high school. The birds obtained entrance to this large three-story brick building by means of a displaced brick. As in all infloored lofts it consists

of nothing but the parallel rafters, with attached lath and plaster, which forms the ceiling of the room below. This frail floor is about ten inches below the entrance hole, and the nest was situated about one foot from and directly in front of the entrance. The place had evidently been used for several years, there being at least a peck of wood chippings, some fresh, but a large quantity old and discolored with age. The nest was placed between two of the parallel rafters and composed of these chippings, being about six inches thick by eighteen inches in diameter. This material had been all cut from the rafters on the floor and the roof overhead. There had been an infinite amount of labor, as large as 2×6 rafters, besides a large number of smaller studding, were chipped over half, and others entirely cut through. The birds seem to have been cutting at the rafters for amusement, as well as material, as everything in the immediate vicinity of the nest was strewn with chips. The male spent much of his time sitting in the entrance or demolishing the rafters; the pecking became so vigorous as to disturb classes in session below.

I regard this last instance as a much greater departure from the normal habits than any other known to me, as in all previously related instances it was compelled to cut through an outer shell after the manner natural to it, except in the occupancy of wagon hub, barrels, chimney crevice and the bank burrows, which differ in no material way in interior arrangement from hollows and burrows in trees. At this rate it appears within the range of possibility for it to breed in properly constructed bird boxes if protected and encouraged to do so.

POSITION.

Prof. Lynds Jones voices the general verdict when he affirms that the trunk of the tree is much preferred, but the main limbs are sometimes used. It seldom if ever carves out for itself a home in a perfectly sound hardwood tree. Soft punky stubs and trees that are entirely dead or have decayed portions are almost invariably selected. If the tree chosen is a large one, the excavation is confined to that side of the trunk in which the entrance is made. It excavates with the grain of the wood, so that if the trunk of the tree is slanting

the excavation will have the same slant. When the tree is leaning the entrance will be made on the under side, otherwise the rain would enter and fill the excavation. Once he found a nest in the horizontal branch of a tree not more than two feet from the main stem. The hole was bored in the side of the branch and carried at right angles toward the tree bole. The next year the same entrance was used, but the burrow dug out of the opposite side, the old cavity not being used at all. Natural cavities are sometimes chosen and the entrance enlarged. Once such a nest came to grief during a heavy rain, when it filled with water, ruining the eggs. As to distance from ground, he says it would be impossible to state any usual or preferred height, for there are none. Mr. Chase once found a nest in a willow post with entrance but twenty-two inches above the ground, and extending down until level with the surface. The height probably varies almost if not quite as much in one section as the other, but apparently averaging higher in the North and South Atlantic than in the Central Western States from data at hand :

South Atlantic States—	Maximum, 100 feet.	Minimum, 12 feet.
Middle & Eastern “ — “	60 “	“ 2 “
Central Western “ — “	90 “	“ 0 “

EXCAVATION.

House hunting begins shortly after the female has chosen her mate. The female leads, assiduously seconded by her partner, in a tour of inspection of all available sites, which often furnishes occupation for days. The following jottings from my note book for '96 are pertinent: April 15th, 9 A. M.—A female flew to old swamp willow, close to creek, and ran up main stem, examining some old cavities on the way; male arrived a minute later and went through the same performance, the female retiring meanwhile; both silent. At 9:30 the female flew directly to the top of the hollow stub, male followed directly after, uttering his love or scythe-whetting song upon alighting, in which the female occasionally joined, but soon left. At 10 o'clock the pair returned, singing common song on the top, apparently decided upon exact spot. Another pair went through the same ceremony on a tree further up the creek at 1:30 P. M. April 21st, three individuals

busy excavating nest cavities, very quiet; until May 16th constructing nests and depositing eggs, rather silent. When business of so much importance is under way there are no more loud rappings, cries or songs, but silence usually prevails in the immediate vicinity of its labors. If love notes are indulged in they are subdued in tone, and the bird stealthily chiseling at its dwelling will quietly creep around to the opposite side of the tree upon the approach of an intruder. Rarely a pair will appear bold and indifferent to observation. With its feet close together, holding on by its claws, and its body well braced by means of the stiff tail feathers, it swings backward and forward, showering yeomanlike blows on the spot selected. The circular hole, just large enough to admit the bird, but scarcely as neat and true as the best work of many others of the tribe, is tunneled in straight for about six inches, then turned down at right angles, and enlarged rapidly to the maximum diameter, which is, as Prof. Jones says, about twice the diameter of the entrance. Often it will chip out several inches above the entrance hole, for what purpose I am unable to more than conjecture. Maurice Thompson is authority for the statement that all of our Woodpeckers construct their nests in the form of a gradually widening pocket or gourd shape, except the Ivory-billed, which drills a jug-shaped cavity. Mr. Robert Windsor Smith describes a bird building her nest thirty feet up in an old post oak on June 10th, '93. The location was close to a public road, and the Georgia railroad, near Duckwood, Georgia. In the formation of this nest the female did all the work; in fact the male did not make his appearance. At the time of the discovery she had already made an excavation almost large enough to conceal her entire body. Often during the operations she would sink into the hole leaving about half her form exposed, remaining in that position but a moment when she would back out and resume her work as before. When a neighboring tree was rapped with a stick, she would creep around to the opposite side remaining there several minutes and peering around as if to learn the cause; if no other effort was made to disturb her she would again resume her place and continue the work unmindful of prying eyes as long as no demonstration was made against her. Wagons and other vehicles passed beneath her and several

freight trains went lumbering along, but she seemed unmindful of what was going on around her. Mr. Smith watched this bird for two days, when he was unavoidably called away for some ten or twelve days and on his return found that the tree had been cut down and carted away. Nearly all agree that both sexes assist in the work. Mr. Angus Gaines mentions a pair in particular, near neighbors and good friends of his, selecting a well seasoned snag, hard and tough, both birds working with a will, turns about, in constructing the nest hole, and returning to the same upon succeeding years. Mr. Francis R. Cope, Jr., says that in one nest he watched construction during the spring of '92, all the chips were carefully carried away some distance into a neighboring meadow; but in all other cases this precaution was not taken, the ground immediately around the foot of the tree being plentifully besprinkled with chips. In the first instance the male would work at the hole for about five minutes and then after carrying away all the chips, his place would be taken by the female, who in turn would labor diligently for another five minutes or so, always carefully carrying away every chip she made. In Iowa, Mr. Jones finds that it does not carry the chips from the excavation any distance from the nest, the chips being scattered broadcast, some falling at the foot of the tree. Mr. J. H. Bowles states that it will sometimes desert its nest when half finished and begin a new one, a trait so common with many of our Woodpeckers. Mr. Stephen J. Adams has found that it requires from one week to twenty days to complete this work and it is often carried on after the eggs are laid, enlarging and smoothing up the cavity, which accounts for the eggs found buried in "saw dust" now and then. Mr. James B. Purdy's experience has been that it takes about two weeks to complete the nest. On April 22nd a Nebraska bird was scared from her nest in a box alder when the cavity was ten inches deep, and on May 4th seven fresh eggs were collected from the hole, now twenty-two inches deep. Allowing a week for deposition, the additional twelve inches must have been hewn out in five days or less—something over two inches daily. When a pair has been robbed, Mr. J. Warren Jacobs finds that in most cases the hole is dug an inch or so deeper before another set of eggs is deposited; and Mr. C. H. Morrel reports

the depth of a cavity in an ash tree as but ten inches in '95, and deepened to twenty inches in '97, in both cases containing eggs.

An old nest is frequently used, thereby escaping days of hard labor, it being not uncommon for a pair to return year after year to the same cavity. Some years ago the late Dr. Willard L. Maris found it nesting in a hole in a tree situated in an open field near Melford, Penna., where for three or four years it successfully reared its broods, and after an interval of some three or four years he again examined the nest—May 10, '94—and was not disappointed in finding it occupied, but whether by the same pair it is of course impossible to say. This is but one of many instances of the kind. Messrs. James B. Purdy, J. N. Clark, James Savage and others have also made note of it.

Many of our birds owe to the Flicker their cozy homes in its deserted and oft times partly demolished breeding chambers. It occasionally furnishes nesting sites to at least one species of Ducks—Bufflehead (*Charitonetta albeola*); all of our smaller cavity nesting Hawks and Owls—Pigeon (*Falco columbarius*) and Sparrow Hawk (*F. sparverius*) and sub-species, Saw-whet (*Nyctala acadica*) and Screech Owl (*Megascops asio*) and sub-species; several Woodpeckers—Downy (*Dryobates pubescens*) and Red-head (*Melanerpes erythrocephalus*); one Flycatcher—Crested (*Myiarchus crinitus*); one Sparrow—European House (*Passer domesticus*); at least two Swallows—Tree (*Tachycineta bicolor*) and Purple Martin (*Progne subis*); our only cavity nesting Warbler—Prothonotary (*Protonotaria citrea*); many of our Wrens—Baird's (*Thryothorus bewickii bairdi*), House (*Troglodytes aedon*) and sub-species; Nuthatches—White-breasted (*Sitta carolinensis*), Red-breasted (*S. canadensis*) and Brown-headed (*S. pusilla*); Titmouse—Tufted (*Parus bicolor*), Black-capped (*P. atricapillus*) and Carolina (*P. carolinensis*); and Bluebird (*Sialia sialis*).

Composition. The lining or bed upon which the eggs are placed has been found to consist invariably of fine chips, probably the last made in smoothing up the chamber. If the wood is extra soft and punky, few if any fragments may be present, at other times some of the eggs will be almost buried

in the saw-dust-like chippings. No extraneous material is ever employed.

Dimensions. The data at hand is so incomplete as to admit of no constant comparison between different parts of the country, or living and dead trees, and hard and soft grained woods; but the depth of excavation appears to be least in the Southern states (6 to 14 inches), and greatest in New York and New England (10 to 36 inches), Illinois (14 to 24 inches), Pennsylvania (10 to 18 inches), and Minnesota (9 to 18 inches). The averages in general, together with the maximum and minimum measurements for the United States, are given in inches and hundredths. The difference in the methods of measuring are so great that much data other than the entrance diameter could scarcely be relied upon, but undoubtedly the depth of cavity depends in no small degree upon the quality of the wood.

	MIN.	MAX.	AVER.
Diameter of Entrance.....	2.20	5.00	3.28
Diameter of Cavity near Bottom.....	4.50	10.00	7.67
Depth of Cavity from Entrance.....	6.00	36.00	15.79
Total Length of Cavity.....	9.00	40.00	18.50

EGGS.

Deposition. Almost invariably an egg is laid daily until the clutch is complete. Indeed, such is the great fecundity of the species that it will often continue under exceptional circumstances to deposit an egg daily, with or without an occasional day of recoupment, until it multiplies the number in a typical set several times over, and that without a radical diminution of the properties of the egg. Records of even the most prolific of our wild birds laying more than a single egg daily are so few that an instance given by Mr. C. H. Morrell, Pittsfield, Maine, is of more than usual interest: On May 21st, '97, at about sunset a cavity in an ash slab was sawed into and the three eggs taken out, examined and returned; on the 26th it contained nine eggs, which were collected. It looks very much as if two eggs had been deposited in one day and from appearances all must have belonged to the same bird. Certainly no egg was overlooked upon the first visit.

Arrangement. The eggs usually remain in the position of deposition, becoming adjusted to the body during the frequent turning to which they are involuntarily subjected. When the cavity is small and the clutch large they are sometimes placed in two layers, the fine chips protecting them from injury. The arrangement of a heavily incubated set containing the unusual number of thirteen eggs taken by Mr. H. J. Flanagan in Providence Co., R. I., on May 30th, '98, was peculiar, if not unique. The entrance, eighteen inches above the ground, in an apple tree, and had been previously broken into so that the eggs were in plain sight. The trunk had been hollowed out to a diameter of ten inches or so, and the eggs laid in one row of five and two rows of four each. Two eggs which contained dead embryos appeared of a dark brown color. One was situated almost in the middle of the central row, and the other in the center of one of the outer rows, about one egg separating them.

Clutch. As a rule the minimum number of eggs in a set is found in the south, where the usual clutch appears to consist of but 5 or 6 eggs, a larger number being rather unusual. The whole north appears to be more favorable for the maintenance and development of much larger broods; most commonly 6 to 9 eggs are laid; sets of 10 not uncommonly, while 12, 13, and even 14 eggs are not wanting; larger sets are unknown, with one possible exception, published in the *Forest and Stream*, Vol. XXV., p. 427—a brood of 19 young, all alive and in good condition.

LOCALITIES.	NO. OF EGGS IN SET.											
	4	5	6	7	8	9	10	12	13	14	Total	
N. C., S. C., Ga., Fla., Ala., La.	3	11	6	.....	2	.....	.....	.....	.....	.....	22
Del., Pa., N. J., N. Y., Ont. (Toronto)	3	9	21	17	10	11	1	3	.....	1	76
New England.....	2	4	5	2	20	3	6	.....	1	.....	43
O., Ind., Ill., So. Mich., Ky.....	2	1	3	4	1	2	1	.....	.....	.....	14
Wis., Minn., Ia., Neb., Kas.....	4	2	6	11	7	1	5	.....	.....	.....	36
Total.....	14	27	41	34	40	17	13	3	1	1	191	

The southern bird makes up for the smallness of her set by producing a second brood in many instances. Mr. Arthur T. Wayne, Mt. Pleasant, S. C., says that two, and sometimes three broods, are reared in a season, a fact which has been noted by Bendire also.

Season's Aggregate. The Flicker has the reputation of laying more eggs under exceptional circumstances than any other species. Nearly every observer has something to say regarding this peculiarity and the persistence with which it is carried out. Mr. J. Warren Jacobs has found that on several occasions, when the eggs were taken before the set was completed, he has been rewarded with another egg on his return the next morning; and after laying 6 or 8 eggs, the bird rested a few days before beginning a new set. Mr. Paul Bartsch finds it to be a very patient and persistent layer; if one removes all the eggs except one from an incomplete set, and keeps this up day after day, the Flicker will try to complete the set, depositing egg after egg until her supply or patience is exhausted. He has in this way taken 17 eggs from one nest. Mr. J. H. Bowles stated that a friend once collected 25 eggs from one nest before the poor bird finally gave it up. Mr. J. B. Purdy

once found a nest in a cavity of an apple tree, and as soon as the first egg was deposited it was removed, and as fast as all subsequent eggs were laid they were removed; the bird continued to lay day after day until she had deposited 27 eggs. Mr. F. A. Colby has known it to lay as many as 28 eggs in a continuous stretch; a day perhaps was skipped after the boys robbed her, but she did not stop laying more than two days at a time when relieved of four to six eggs in a bunch. Rev. P. B. Peabody discovered a nest among a dense growth of black oaks, averaging about six inches in diameter. It was placed eighteen inches from the ground in a cavity, which, according to his remembrance, was partly natural and partly excavated by the birds, the depth being very slight. One or two eggs only were taken at the time at first, whereupon the mother Flicker, like so many others on record, began to spin out her "set" to the number of 30 or over before giving up in despair. Mr. J. H. Armfield reports the taking of a large number of eggs from a cavity in a maple tree near a spring, seven miles S. W. of Greensboro, N. C., in '98. Five eggs were collected on May 6th, and every two or three days thereafter all eggs found were gathered; the female continuing to lay, not every day, however, until July 5th, when she had deposited 48 eggs. This is the next to the largest on record. In relation to that historic and extraordinarily prolific bird of Taunton, Mass., little can be added to the meagre notes recorded by the collector at the time. The eggs were taken one at a time from a cavity in a willow, beginning May 6th, '86, leaving a nest egg, until 71 had been deposited. Mr. Chas. L. Phillips informs me that some of the eggs were accidentally broken and the remainder disposed of to Mr. F. B. Webster, the well known dealer, who in turn writes me that he has entirely lost sight of the Phillips collection, and has no means of tracing it, as it may have been broken up for decorative purposes. No measurements were taken, and while the collector is inclined to think they were all the product of one female, it is not impossible that a second bird whose own nest had been demolished, may have "jumped the claim" in preference to chiseling out a fresh nest so late in the season, and after one day's interval contributed her share to the grand total. Still, as Mr. Phillips argues, it is unlikely. It is unfortunate that this series of eggs was not better appre-

ciated for its scientific value. While this method of collecting eggs is hardly scientific and only justifiable in rare cases, permit me to advise the collector occasionally practicing it, to fix the identity of the female by means of some peculiarity of voice, habit, or plumage, if possible ; and to carefully number and measure the eggs in the order of deposition, time on nest, etc. Collected from all sources we have the following :

Massachusetts.....	15 eggs, taken in sets, no nest egg
Connecticut.....	17 eggs, taken in sets, no nest egg
Pennsylvania.....	17 eggs, taken in sets, no nest egg
Iowa.....	17 eggs, taken singly, nest egg
New York.....	20 eggs in 27 days, in sets, pigeon's nest egg
Connecticut.....	21 eggs daily, nest egg
Massachusetts.....	25 eggs daily
Michigan.....	27 eggs daily, no nest egg
Massachusetts.....	27 eggs, in sets
Vermont.....	27 eggs, in sets
Nebraska.....	28 eggs, in sets, no nest egg
Illinois.....	28 eggs, singles and sets, nest egg
Pennsylvania.....	30 eggs in 40 days, in sets, no nest egg
Minnesota.....	30 eggs daily
Indiana.....	37 eggs in 49 days, in sets, no nest egg
Texas.....	40 eggs in 40 days, no nest egg
North Carolina.....	48 eggs in 65 days, no nest egg
Massachusetts.....	71 eggs in 73 days, nest egg

Mr. C. L. Rawson, the veteran oologist, who is perhaps better known as "J. M. W.", of Norwich, Conn., has looked over some oological data, taken from field experiments made by himself and his climber since '76, and has come to the conclusion that the Flicker lays no more eggs in proportion to the usual number in a set when stimulated in some way, than many other species of various genera. Twice by the nest egg and at times by the substitution process he could take but 21 eggs from the Wacup, but in the same manner his notes say he has taken

11 eggs from the Common Tern (only one pair nesting on islet).....	Equal to 3 sets.
20 eggs from the Sora Rail (only one pair in bog).....	Equal to 2 sets

32 eggs from the Bob-white (identification of same bird sure).....	Equal to 3 sets
16 eggs from the Marsh Hawk.....	Equal to 4 sets
17 eggs from the Sharp-shinned Hawk.....	Equal to 5 sets
13 eggs from the Cooper's Hawk.....	Equal to 3 sets
9 eggs from the Red-shouldered Hawk.....	Equal to 3 sets
9 eggs from the Barred Owl.....	Equal to 3 sets
21 eggs from the Flicker.....	Equal to 3 sets
13 eggs from the Meadowlark.....	Equal to 3 sets
11 eggs from the Purple Finch (besides 4 eggs of Cowbird).....	Equal to 2 sets
12 eggs from the Vesper Sparrow.....	Equal to 3 sets
16 eggs from the Parula Warbler.....	Equal to 4 sets
20 eggs from the Long-billed Marsh Wren.....	Equal to 3 sets

Numerous instances in which that pest, the European House Sparrow, has equaled or even exceeded the best ratio given by Mr. Rawson in the above interesting list, might be given.

Dates. The nesting period averages much later than is generally thought by writers. The time for fresh and complete sets varies of course, according to the season, but the following averages compiled from a large amount of data will be found in most instances to be approximately correct in average seasons :

LOCALITIES.	AVERAGE.	VARIATIONS.
N. C., S. C., Ga., Fla.....	May 4...	April 10 to June 7
Penna., N. J.....	" 15...	" 28 " 26
N. Y., New Eng. (except Maine)...	" 22...	" 14 " 6
Maine, Ont., N. S.....	" 30...	May 14 " 18
Louisiana.....	" 7...	" 5 to May 10
Ohio, Ind., Ill., So. Mich.....	" 22?..	" 2 to June 30
Iowa, Neb., Kans.....	" 10...	April 24 to May 28
Minn., Wis.....	" 18...	May 10 to June 1
Alaska and N. W. Ter.....	June 10.....	

Mr. Arthur T. Wayne finds the average date in South Carolina to be April 21st, except in '95 (a late season) when it was May 9th.

Shape. The contour is subject to little variation, the typical egg being ovate ; now and then an oval specimen is found,

and more often sets in which the eggs are irregularly elliptical ovate, sometimes sharply pointed.

Color. Fresh eggs are a beautiful translucent white, the yolk showing through and suffusing the whole shell with a mellow delicate pink. When blown this pale wild rose bloom disappears, the shell retains the translucency in decreasing amount until it is dry when it is simply a pearly glittering white.—Lynds Jones. All colorless fine textured eggs, especially when fresh, seem to emit a faint glow and in this state are admired by field oologists more than the clear porcelain white specimens in the cabinet. Not rarely a set of prepared eggs show a creamy suffusion, which, if the cause was unknown, would deceive one into believing it to be naturally produced. If the eggs are left standing unblown for a number of days, the yolks will settle and the lining absorb enough coloring matter to stain it a uniform creamy-buff, which, showing through the semi-transparent shells, gives them the same appearance. With every reason for the belief that the prehistoric bird had a reptilian ancestry and that plain white eggs would most naturally be produced by the descendants of such progenitors for a time at least, uncolored eggs must be regarded as the least modified as far as external appearance goes. Some species advanced along the line of involuntary protective coloration of their eggs, while others habitually nesting in dark cavities, in large colonies or practically safe places, as the Petrels, Pelicans, Pigeons, Owls, Kingfishers, Woodpeckers, Swifts, Hummingbirds, etc., have undergone slight changes apparently. According to Dr. Brewer, "Any egg, always excepting a Woodpecker's, is liable to be marked (stained) by minute infusions of colored lymph of the parent in exclusion." On what grounds he excludes the Woodpeckers is purely conjectural, but if it is on account of the fine texture and polish, the Kingfishers should also have been made an exception. It would appear, moreover, that Woodpeckers' eggs are occasionally spotted. It is reported that Audubon once found a set of spotted eggs of the Three-toed Woodpecker. Angus Gaines, Viscennes, Ind., noted a set of eggs of the Red-headed Woodpecker with reddish spots at the larger ends (see *Oologist*, Vol. XII, p. 118) and in Vol. VIII, p. 96 of the same paper a set of four eggs of the Flicker, spotted with dull red, is recorded

from Fairbank, Minn.; and J. H. Bowles, Ponkapog, Mass., describes the latter species as sometimes laying eggs minutely spotted with dots of red or black, for the most part easily washed off.

Texture. The shell has a fine smooth surface with a porcelain-like gloss normally. A set of five in my cabinet collected at Avery's Island, La., is quite unusual in having no gloss whatever. Granulations appear upon the larger ends not infrequently, being much more noticeable on a white and polished surface than upon a colored or lusterless specimen. Mr. Jacobs, in describing the abnormally large egg in the Ottawa, Kansas, set, notes a number of dead white granulations scattered over the shell at random, and at one side a decided hump; a large circular patch on the larger end is also dead white, indicating a thin spot in the shell.

Measurements. The average of over 500 eggs, nearly all of which were taken in the United States, is $1.09 \times .85$. 173 eggs taken in New York and Pennsylvania are but a very small fraction above the general average. When amassing data, the extraordinary amount of variation to which it proves subject was not taken into account and what was at first considered a fair number of measurements proves insufficient material for a series of locality averages. The South, Northeast, and Northwest show surprisingly little difference in general averages. Leaving out the series of 48 eggs taken from a single bird inhabiting the mountains of Western North Carolina, reduces the Southern average to $1.06 \times .84$, and a further reduction to $1.02 \times .83$ is made by not including the Louisiana (Avery's Island) series which are large eggs also. On the other hand many eggs from Maine, Iowa, Minnesota and Nebraska are unusually small, thus lowering the averages of their respective localities.

LOCALITY.	NO. EGGS.	AVER.	MAX.	MIN.
South (N. C., S. C., Ga., Fla., La.).....	133	$1.098 \times .849$	$1.24 \times .92$	$.90 \times .75$
Northeast (New England, New York, Ontario—To- ronto—, Pennsylvania). .	233	$1.090 \times .855$	$\left\{ \begin{array}{l} 1.15 \times .91 \\ 1.22 \times .86 \\ 1.21 \times .88 \end{array} \right.$	$\left\{ \begin{array}{l} 1.00 \times .75 \\ .96 \times .80 \\ .97 \times .73 \end{array} \right.$
Northwest (O., Ky., Wis., Kas., Neb., Iowa., Minn.) }	126	$1.088 \times .855$	$1.41 \times .93$	$.93 \times .65$

The major axis is subject to much greater variation than

the minor axis, which is I believe, the case with all kinds of eggs.

A set collected at Mt. Pleasant, S. C., April 21st, and now in the collection of Mr. R. P. Sharples, measure $1.17 \times .89$, $1.24 \times .92$, $1.19 \times .90$, $1.10 \times .84$, and the collector—Mr. Arthur T. Wayne—says they might easily be mistaken for the eggs of the Pileated Woodpecker. It remains for the Ottawa, Kansas, bird, already referred to as building in a school house loft, to break the record in the dimensions of one egg. The set is now in the collection of Mr. J. Warren Jacobs and measures $1.16 \times .94$, $1.15 \times .91$, $1.15 \times .88$, $1.17 \times .94$, $1.21 \times .92$, $1.19 \times .91$, $1.41 \times .93$. Equally remarkable is a set of small eggs collected by Prof. Ora W. Knight, Bangor, Maine, June 14, '93— $.85 \times .75$, $.99 \times .79$, $.98 \times .77$, $.87 \times .79$, $.77 \times .72$ —and is probably a second or third set. The average of 16 eggs known to be of the second laying is slightly less than the general average— $1.07 \times .84$. Mr. Chas. L. Phillips, who took 71 eggs from one hole in 73 days, states that they appeared of the usual dimensions with very little variation; a fact also noted by J. Parker Norris in the *Ornithologist and Oologist* after he had collected 30 eggs from one pair and found the last egg as large as the first. The measurements of the 48 eggs taken from one bird near Greensboro, N. C., as already briefly mentioned under the head of *Season's Aggregate*, are before me, although unfortunately not in exact order of deposition, and exhibit a great difference in size—from $1.08 \times .80$ to $1.17 \times .87$ —much larger than the general average. Runt eggs are by no means scarce, in fact I consider them more often occurring in this species than in any other of the family. Mr. Otto Grady, Ludlow, Ky., found a nest June 24, '95, containing six young ready to leave, piled pellmell on top of one another, and three runt eggs; one being as thick as an ordinary Robin's egg and much longer than the average Flicker's egg, the second the size of a Red-headed Woodpecker's egg, and the third almost globular. An Orleans County (N. Y.) collector took 20 eggs from a pair in 27 days, the 8th and 9th being runts. Another is incidently mentioned by another New York oologist, but no particulars given. There is a distinction between the small fertile eggs such as are given in the locality table, and the

runts which are excluded from all averages ; such as I have measurements of appear below :

Toronto, Canada.....	June 7, '95, in set of 8 eggs, .70 x .56
Grinnell, Iowa.....	.67 x .58
Avery's Island, La.....	May 14, '95, in set of 6 eggs, .79 x .62
Port Hope, Ontario, Canada.....	June 10, '98, in set of 4 eggs, .79 x .65
Philo, Illinois.....	May 11, '98, in set of 9 eggs, .83 x .67

In Other Birds' Nests. When the exact circumstance of deposition is unknown, the owner of a nest in an old Woodpecker cavity is the bird placing the lining therein, the chamber being vacant. It is hardly probable that the Flicker would intrude unless its own nest had been destroyed before the completion of its quota. On June 6th, '89, while collecting near Lake Assawamsett in Plymouth County, Mass., Mr. A. C. Bent explored an old orchard. One tree contained a Bluebird's nest with five eggs of the owner and one of the Flicker's, and in a neighboring cavity a deserted nest of a Tree Swallow with the same number of eggs. A not much frequented place and while possibly the work of some boys, it is hardly probable. A similar instance is recorded by E. G. Elliot, Bradford, Mass., May 16th, '84, of a set of five eggs of Bluebird and one of Flicker, nest of grass and feathers. Records of European House Sparrow and Red-headed Woodpecker eggs in freshly excavated quarters with one or more eggs of the Flicker are not uncommon, and upon investigation the latter proved to be the aggrieved party in every instance. In the *Oologist*, Vol. XII, p. 76, Walter Draper, Barahoo, Wis., gives an interesting account of an "Eccentric Flicker." He observed a Mourning Dove's nest in process of construction on a limb of an oak tree near a path, and a few mornings later was surprised to see a female Flicker on the nest. She was not disturbed at that time, but returning at noon to investigate, the Dove was flushed from her own two eggs and a cracked egg of the intruder found near the edge where it had probably been shoved by the proprietor.

INCUBATION.

Few birds so timid and defenceless as the Flicker, sit so closely and presistently. While occasionally it may be seen to fly from its nest at a near approach, it is usually very hard to drive out ; shouting and pounding upon the base of the tree having little effect, and often it is necessary to prod the bird with a stick or reach in and pull her out by the beak. She is gentle and harmless, never offering to claw, bite or strike, although capable of inflicting a painful wound if disposed to use her strong beak. When caught she will struggle violently for a moment or utter a long wailing, despairing shriek which will be answered by the mate if within hearing distance. In one instance described by Mr. Jacobs the female returned and entered the partly destroyed cavity, emerging only to re-enter and re-examine her home the second and third time ; and at another time when the female was flushed and set collected after dark, she came quite near and alighted on his back acting as if very much dazed or blinded. Prof. Jones has found it occasionally making fierce dashes at the intruder and also relates an incident of his first experience with it as a close sitter, taking it for an Owl and dropping three large stones upon it in the vain hope of causing it to vacate. When the nest was opened she was found pinned down by the stones but so carefully protecting the eggs that not one was broken, and happily she seemed unharmed also. For a bird habitually nesting in dark situations, it seems strange that it exhibits such a dislike and inaptitude for movement after the sun has set, acting stupidly and deserting the nest for good if disturbed at such a time. Incubation may commence soon after the first egg is deposited, or in accordance with the great majority of birds, after the set is completed. More than 90 per cent. of the sets of which I have data show the latter condition, and curiously enough, all but two instances (Louisiana and Kentucky) of irregularly incubated eggs occur in the New England and

Middle States ; from which we may infer that this species, as well as the Cuckoos and Kingfishers, are more addicted to this sort of thing, for which I believe no cause has yet been assigned, in the east than in the west. Most birds incubate by squatting upon their eggs in an upright position. One observer suggests that the Flicker may assume the posture of a Screech Owl while upon the nest, as in every case where he has opened the chamber it has been found lying upon the eggs ; but it is more than possible that the parent lay close but momentarily to avoid the falling *debris*, protect the young or eggs, or in the vain hope of escaping notice. Mr. Sinclair has had exceptional opportunities of observing the bird on her nest without disturbing her in the least, in the garret of the school building alluded to under the head of *Position* ; the loft being pitch dark excepting the light entering the rough entrance, in front of which the female sat upright like any ordinary bird. I have ample proof that it is doubly monogamous, though the observers with few exceptions have not found the male taking his turn at covering the eggs. It may be a more common trait in the east, where the bird is frequently lifted from a set of eggs well along in incubation. Sometimes near the middle of the day the male appears and utters a few love notes, when he is at once joined by his brooding mate, who soon hurries off in search of food, while the devoted male takes her place on the eggs. On June 12, '97, I was in the vicinity of a nest placed 35 feet up in the dead top of a chestnut tree in the woods, while the change was being effected. Time, 1:45 P. M. ; birds on tree ; short duet of *wick-a-wick* or breeding song ; both flew away, male returning in five minutes, alighting 12 feet below entrance, and after a thorough reconnoitre in which he undoubtedly observed me, ascended almost imperceptibly, halting four times to look about. Silent and very cautious, taking 25 minutes to get within a foot of entrance. Still suspicious and will not enter, but noiselessly flying to a bare limb and dropping from it to a lower and yet lower branch and back to main stem. As I stole softly away from the foot of the tree, unable to remain longer, he peeped shyly around the trunk at me. On May 28, '98, at 12:30 P. M., I took a male from a nest containing 7 eggs, in which incubation varied from commenced to small embryos, the absence of abdominal feathering proving

that it was a regular task. The female was feeding at the opposite side of the grove. Prof. Lynds Jones has one record of the duration of incubation, which was 14 days. Major Bendine gives it as about 15 days in his *Life Histories of North American Birds*. It doubtless varies to some extent, according to locality and season.

YOUNG.

It is hatched both blind and naked, remaining in this helpless and callow condition for over a week. It is not known when the white membranous process which extends from either side of the base of the lower mandible disappears, but it probably goes at a very early age. This formation is apparently peculiar to all young Woodpeckers, as suggested by Frank A. Bates in the *Ornithologist and Oologist*, Vol. XVI., p. 35, but its use is unknown. The young are often piled on top of one another, but soon learn to cling to the side of the cavity and avoid too much crowding. On cold or stormy days one of the old birds covers them at intervals, as well as at night, when extremely young. Nearly every one is familiar with the sounds uttered by the unfledged brood, which has been compared to the hissing of a nest full of snakes; as they grow larger, to the winding of a clock; and finally to the click and clatter of a mowing machine. If the tree or stub in which they are situated is pounded, their combined voices increase to a perfect storm of vociferation. Both sexes feed the young with equal assiduity, and up to the time they leave the nest, by the process of regurgitation only. Nuttall appears to have been the first to discover this peculiarity, but when it was more fully commented upon a few years since by Olive Thorn Miller in *Nesting Time*, William Brewster in *Auk*, Vol. X., p. 231, and J. N. Baskett in *Nidologist*, Vol. II., p. 110, it appeared something in the nature of a revelation. Mr. Baskett kindly furnished me with some data relating to the same nest full of young, from which he took the notes for his article in the above magazine, and is substantially the same. The parents appeared to have different places from which to procure food, and were gone at irregular intervals, rarely both present at once. Nothing was ever visible in their mouths, and the regurgitation, while labored, never seemed to indicate that any large portion was being thrown up. The parent drove its

beak down the gaping and screaming throat of the nestling and began a jerking and riggling motion which seemed to tax the efforts of the youngster to hold on, the process lasting for some seconds and seldom repeated at the same visit. As the adults do not remove the excrement, the bottom of the basket-like nest soon becomes foul, but the young manage to keep clean holding tight to the walls by means of their sharp claws, soon creeping to the entrance to peep out on the great world without or to look and listen for the parents, there to receive the food. Thus a period of from two to over three weeks is passed, after which they emerge to spend the day on the tree trunk or large branches, blinking and sunning themselves in the bright light, returning to the security of the chamber on the approach of a storm, threatened danger or return of night; for after all it is their home nest, snug and safe, and by no means the "black hole of Calcutta" imagined. In a few more days the adults, by means of much beseeching, encouraging and threatening language, persuade one after another to try its wings, and short flights are made from limb to limb and tree to tree amid much excitement and flurry. Prof. Jones says that the ability to fly seems to be an individual characteristic, some being able to do so much earlier than others of the same brood. They depend on the food, small fruit and ants mainly, brought them by the old birds for some time after departing from the home-tree, and are supplied with a small quantity of gravel (grinders) before leaving the nest. Apparently the juvenile makes its first essay to supply its own wants while on the ground, as nearly all June and July specimens were shot from that position. The tongue of the nestling is harmless; just when the barb appears I am unable to say. One bird over a week out of its nest had not developed it. Mr. Baskett says that in the fall the young of a family keep well together.

MOLT AND RENEWAL.

The single annual molt, which is complete, occurs directly after the breeding season in the manner described by Prof. Lynds Jones for this paper: The molt of our common Flicker, as illustrated by four specimens, follows the general law of our smaller land birds, with the differences peculiar to the Pici. In these four specimens there are exhibited some individual peculiarities of no importance except as illustrating the principle stated by Witmer Stone, in his admirable paper on the molting of birds, that there are likely to be individual peculiarities of molt within the species. It is well known that among the Woodpeckers, whose tail is used as a support in clinging to perpendicular surfaces, that the middle pair of tail feathers are the last to be lost, and that they are retained until the next pair has grown to a functional length. Apparently the middle feathers, rather than the outer ones, are retained because they are the strongest and are therefore the best able to sustain the weight of the body unaided by the others. Of the four specimens, two are males and two females. I am unable to decide whether they are birds of the year or old ones. There is no apparent difference in the process of molting of the sexes. In common with most other small land birds, the Flicker first molts the middle row of the abdominal tracts, followed almost immediately by the innermost—the 10th—primary and the outermost greater wing-covert. The 9th primary is next shed, and with it the middle row of the pectoral tracts, the two rows next the middle row of the dorsal tract, the middle of the humeral tract and the lower row of the femoral tract. Next the 8th primary, throat, sides of crown and scattering feathers on the thighs. At this stage the regions of first molt are beginning to show new feathers and the molt of the contour feathers has spread somewhat in all directions. With the 7th primary the next to the middle pair of tail feathers, the whole head except the middle of the crown.

Enough old feathers remain in the crown to form a covering. With the 6th primary the next pair of tail feathers, the outer rows of ventral tracts, middle wing-coverts. With the 5th primary the next to the outer pair of tail feathers, next to the inner secondary, middle of crown. With the 4th primary the outer tail feathers, inner secondary, lower row of lesser wing-coverts, two outer pairs of upper and under tail-coverts. With the 3rd primary the remaining upper and under tail-coverts, outer rows of dorsal tracts. At this point the plumage assumes a smooth, clean appearance, the new feathers almost completely hiding the old ones. With the 2nd primary the middle tail feathers, outer secondary, and inner tertiary drop. With the 1st primary the remaining inner rows of the abdominal tracts and humeral tracts, the remaining lesser wing-coverts, with any other unmolted feathers, are lost, completing the molt. With their renewal the plumage is again complete. The last three primaries—1st, 2nd and 3rd—are molted in rapid succession, the third one being but half grown when the first one breaks its sheath. The slow molt of the tail is characteristic of this order, and is a necessity, as hinted above. As a rule among the small birds the tail feathers are molted practically simultaneously. Almost everywhere over the body some old feathers remain unmolted until the new ones are nearly or quite grown. The old plumage presents a much faded appearance, lacking the marked contrast of the new, and appearing much harsher and coarser, due to the worn tips and edges. At no stage of the molt is there any part of the body entirely bare, nor are the flight feathers molted rapidly enough to hinder flight. During the molt the birds seem to feed largely upon such insects as can be easily caught upon the ground or in the grass, indicating a relatively low state of vital force. As to the time of molt: One of the specimens before me which has the molt fully half complete, was taken on July 5th. Another with the molt complete but with the first primary about two thirds grown, was taken on October 17th. This specimen does not seem to be a bird of the year, the other may be. It is hardly possible that one bird requires all the time from the last week in June to the third week in October to complete the molt and renewal. Probably half that time is amply sufficient.

My series of adult birds relates more to the renewal than to the earlier stages of the molt, and in nearly every particular attest to the correctness of the sequence revealed by Prof. Jones' minute examination. The middle rectrices grow more slowly than the first, second and third primaries, which are shed almost simultaneously and grow rapidly. Three specimens taken on September 26th, two on October 3rd and one October 10th—all at Berwyn, Penna.—show the middle feathers from half grown to almost equal to next pair, while the primaries are complete, although the last sheath has not always disappeared. Of two Georgia specimens taken September 10th, the first shows the 3rd primary three-quarters, the 2nd two-thirds grown and the 1st not shed, central tail-feathers dropped and pin feathers on chin and throat; the other shows the 3rd primary four-fifths, the 2nd and 1st one-half grown, middle pair tail feathers one-half grown, also pin feathers in malar and chin. A June 10th specimen from the same locality, varies in having the outer rectrices one-fourth and four-fifths grown, otherwise apparently complete renewal. This bird must surely have remained unmated or lost its mate early in the season, otherwise it could scarcely have been in so fine a dress at that date. Another peculiar state is represented by a hybrid from Santa Cruz, California, September 3rd, with the 3rd primary one-half, outer secondary three-fourths grown at the same time, next to middle pair of tail feathers molted, malar and forehead just renewed. Apparently the feathers about the head and throat begin to drop early but new feathers develop slowly. The central rectrices are the last important feathers to attain their growth.

The juvenile Flicker molts and renews its entire plumage the first year in common with all Woodpeckers, which are numbered with the few groups among the *Altrices* doing so. It varies little if at all from the adult. Seven Georgia birds but a few weeks at most out of nests, taken between June 28th and July 18th, are in various stages of molt and renewal; the red cap often confined to the forehead. A bird taken July 10th had commenced to molt on nape, malar, breast and rump, the 6th primary almost complete, top of head renewed except forehead, a pair of new feathers of the autumnal dress had appeared on either side of the breast, and all signs of the red

cap had vanished. This bird is in a very ragged condition. I am inclined to ascribe the early disappearance of the red cap to growth and abrasion in a similar manner to the small patches of natal down in which many of the *Altrices* appear, i. e. : the gray feathers growing beneath on the same stem push the red tips upward where they become dead and brittle, rapidly crumbling away. The forehead does not always show signs of molt and possibly may occasionally remain until the following fall.

In Pennsylvania the renewal is complete by the first of October usually, often a week or so earlier.

FOOD.

From an economic standpoint the supreme test as to the beneficial or injurious nature of a very large number of our birds is adjudged from a knowledge of their food habits, more especially if their value as an article of food or for manufacturing purposes is important. To be wholly beneficial a species must feed upon that which is directly or indirectly injurious and in a manner entailing the least possible damage to that which may be utilized by man. Few birds will be found to meet all of the requirements of so exacting a standard, and if the good overbalance the bad qualities, or even if their habits are of a neutral or doubtful character, they should be protected as far as it is possible to do so. Recent investigations conducted by the United States Agricultural Department warranted the statement that "Judged by the results of stomach examinations of the Downy and Hairy Woodpecker and Flicker, it would be hard to find three other species of our common birds with fewer harmful qualities." The Flicker differs from all other Woodpeckers in being more terrestrial. Being equally adept in foraging above or upon the ground, it has a much greater variety of food to select from, consequently waxes fat, is more numerous and covers a greater area than any other member of the family in North America. There is little difference in the nature of its food and feeding habits, north, east, south or west; though of course being somewhat more insectivorous in the warmer climes during the colder months. It is almost completely insectivorous from the latter part of March until well into June. Ants form the staple food however. Professor Beal of the United States Nation Museum, places it at about 75 per cent. of the insect food or 45 per cent. of the whole matter for the year. It is often discovered standing over a colony, catching the ants as they emerge or digging vigorously into the soil with its sharp pickax to unearth them, its bill being almost constantly coated with earth from this

habit. In Michigan it seems to have a preference for the mound-building ants (Purdy). In Georgia there are myriads of small red ants which infest every path and byway in summer and one cannot help noticing their funnel-shaped abodes; upon these ants it wages eternal warfare so that its flesh becomes so thoroughly impregnated with the pungent odor so peculiar to these little insects as to be clearly perceptible when removing the skin. It also preys upon a black ant found under the bark of dead trees, but as they are not so plentiful as the former, they do not predominate as an article of food (Smith). I have the result of an examination of twenty-five stomachs, including seven taken from juveniles, collected in DeKalb County, Georgia, by Mr. Robert Windsor Smith. Every month in the year is represented with the exception of May, August and November. In all but two, quantities of either red or black ants were found, with a fair amount of undetermined fragments of *Coleoptera* in ten, one contained a mole cricket in addition to the ants, another three grubs and a large black ground beetle, while the October bird had eaten its fill of gumberries, the same fruit being found with an assortment of insects in the two September birds. Somewhat to my surprise the January bird had eaten the largest number of insects, its stomach being distended with the 841 ants, fragments of 2 ground beetles and 8 pieces of white gravel (299 small red ants, 492 small winged ants, 40 pupa, 3 mound-building ants, 7 ants—species undetermined). The seven young birds had left the nest, though occasionally fed by adults, and were taken between June 28th and July 18th—five in '98 and two in '99. All contained red ants with the addition of wild cherries in them, and beetles in a fourth. A small quantity of white gravel found in all or nearly all young. The stomach of one taken on July 12th contained several pieces of red gravel, in addition to quite a quantity of the usual white flint, and another that two days later had swallowed a splinter of weather-beaten wood, probably their first attempts to feed themselves. In Iowa it is often seen darting after insects in the manner of Flycatchers. Stomachs examined have invariably contained remains of Carabid and Scarabid beetles, with the skins of *Lepidopterus* larvæ and numerous ants (Jones).

In Pennsylvania I have found as much as 157 large black

ants, 7 May beetles, and a large green larva in a single stomach. Large grubs, crickets and red ants are commonly found. I think there should be no question regarding the inestimable services rendered in keeping within reasonable limits the numerous varieties of ants. In Indiana it not only devours large quantities of mature insects, but their eggs, larvæ and chrysalides (Gaines). Wilson says it also feeds upon woodlice. Grasshoppers when in season form no inconsiderable portion of its food. In early spring and early fall its manner of feeding on the ground is to collect in small, loose flocks, travelling back and forth along the edges of a wood, around a hillside or in a meadow; silently clearing the group of its insect pests, only flying up when disturbed or satisfied; in this manner often mixing in with the Meadowlarks, and in the West extending well out on the prairies at a considerable distance from timber or trees of any kind.

As a correspondent suggests, birds, like other bipeds, only "scratch for a living" when necessity makes it compulsory. Whether its system demands a change of diet or to put its young in the way of feeding themselves or from sheer laziness, it becomes largely frugivorous from late July to November or until its departure, feeding upon the fruit, as it ripens, of the wild strawberry, raspberry, serviceberry, mulberry, red cherry, dewberry, blackberry, huckleberry, elderberry, pokeberry, black cherry, grape, dogwood, black alder, wild plum, hawberry, gum and hackberry; a perfect profusion and succession of wild fruit; often to the almost entire exclusion of insect life, growing fat upon the pulp diet. It is noted by Mr. Robert Windsor Smith that when the bird is gorged with berries but little gravel is found in its stomach; this also applies to many others of our so-called insectivorous birds. I have known it to eat so largely and continuously of certain small fruits that the stain of the highly colored juices would penetrate and saturate the intestines, abdomen, and even dye the bases of the feathers a rich red or purple; particularly so when pokeberries are indulged in. It is extremely fond of the fruit of this plant, and in this connection I wish to state that Dr. W. E. Rotzell has given some attention to the effects of pokeberries upon birds (*Hahnnemannian Monthly*, '91, p. 790). An extract of this fruit has been prescribed for obesity under

the generally accepted theory that it acts as an anti-fat agent, but the result of his examination tends to prove that wild birds which were gorged with the berries were always in good condition and frequently quite fat.

When the gumberries ripen in September and October, the sour gumtree (*Nyssa Sylvatica*) is the centre of attraction, and its fruit the staple food. If the Flicker is fond of other fruits it loves the gumberry. At this period of its existence it is in the very best of condition, and hundreds are annually shot for food and sport, being, as a southern observer says, fully as good eating as Doves. Many a country boy's first game has been this large, handsome and palatable bird while it was gluttonously feeding upon gumberries. Picture if you can a calm, hazy, autumnal sky, a cool, green, swampy meadow in which grows an old gum tree with its deep-green wax-like leaves already turning to scarlet; the boy creeping Indian fashion from bush to bush or along the old worm fence; the slight degree of uncertainty highly magnified makes it all the more fascinating to him. The murderous report of the old musket loaded with a generous and well-rammed charge of coarse black powder and large shot, the whirl of many wings followed immediately by the scream of the wounded, appeals but momentarily to his better nature. Stimulated by excitement he hurriedly gathers the dead, wrings the necks of the wounded, and retires within easy gunshot. In a few minutes the Warblers, Cedarbirds and Thrushes appear, shortly followed by the Robins; the Flickers scattered to the four winds, call from tree to tree, and finally a young male, totally lacking in experience, flies straight for the tree on galloping wings. He sees nothing suspicious, and after a lusty, long-drawn call, which apparently means "all's well," plunges deep into the foliage to greedily partake of the tempting banquet. The bulk now come trooping in, racing with the Blue Jays, and the clatter becomes deafening when "bang" goes the gun, down come several more victims, and again the survivors go scurrying away, only to return as before and repeat the experience, gradually becoming more and more wary, until those that are left become so wild and alert as to defy the gunshot range. Unfortunately this slaughter does not end with the boys, but is often carried on more or less systematically by

the so-called sportsman, but I am happy to say not nearly as frequently as formerly, in this section at least.

Of course the Flicker occasionally tastes of the cultivated fruits and grains, such as the blackberry, cherry and mulberry, and corn in the milk ; but so seldom as to call forth no complaint. In Illinois he is far less destructive in this respect than his red-headed relative (Gault). The only serious damage reported comes from Farboro, N. C., where he is quite destructive to the peanut crop while the nut is maturing, congregating in great numbers in the fields and playing havoc, often making half a dozen holes near a vine probing for the soft kernel. During the month of August, however, it resorts in great numbers to corn fields in quest of corn worms (Foxhall). Maynard says it is very fond of over-ripe pears and apples. In the North, as the season wanes, the trees, shrubs, bushes and vines become stripped of their fruit, for the Flicker is not the only bird foraging, and the bulk retire southward, leaving the hardy winter resident, usually an old male, to adapt itself to the existing conditions, be what they may, and becomes everything but carnivorous (Bowles). Almost omnivorous, its maw receives the dried or frozen remnants of the wild fruits already named ; also the berries of the red cedar, hawthorn, mountain ash and woodbine ; the seeds of the sumac, poison ivory, clover, grass, and various weeds ; as well as acorns, beechnuts, corn from shocks, and oats, wheat and rye from stacks ; while ants, beetles and larvæ are sought from bark and wood of decayed trees and stumps or gleaned from the bare ground or creek banks. During the winter of '87-'88 a single male took up his quarters in a corn crib near Grinnell, Iowa, and waxed fat on the corn and oats in the bins, but succumbed to a temperature of 20° below zero on the 14th of January (Jones). In Michigan its winter food seems to consist mostly of corn, for where there is a field of corn standing only there the Flicker is found. It also resorts to corn cribs, and probably a few beechnuts and acorns, as well as such insects as can be had are eaten (Purdy). Apparently the Flicker performs the same service in Michigan as the Crow does in eastern Pennsylvania for the slothful farmer, but doubtless less thoroughly. Further south it fares better during the colder season. Near Raleigh, N. C., it feeds upon the waste peanuts

on the ground after the crop has been gathered ; also on the berries of holly and cedar (Brimley). According to Baker, specimens from Florida often contain the berries of the cabbage palmetto. The large amount of insect food secured by a Georgia bird in January has been already commented upon.

It is presumed that where a large number of telegraph poles are perforated or honey-combed, it is not always with the intention to nest, but that the motive is most often suggested by the humming of the wires which it probably mistakes for the boring of insects. It must be admitted, however, that this occurs almost wholly in treeless localities like Cape Cod and Nantucket, Mass., and the great plains of the West. It performs a good service in scattering the seeds of many useful plants and trees, not among the least of which is the pokeberry, whose young and tender shoots are so highly esteemed in the culinary art. It doubtless assists in the spread of the poison ivy (*Rhus radicans*) and poison shumac or poison dogwood (*R. vernix*), since it eats the berries in the fall and winter seasons.

ENEMIES.

Its natural enemies are few and rather unimportant in the extent of their depredations, as far as the adults are concerned, confined almost exclusively to the Hawks and Owls. Mr. J. H. Bowles observes that the swift little *Accipiter velox* considers it a great delicacy. I witnessed one instance of its unsuccess, however, while watching a number of Flickers feeding in a meadow. Suddenly a commotion occurred half way up the hillside, exciting the whole community; a young male Sharp-shin had darted to where a pair were feeding. Tumbling over in their haste and terror, they dodged and ran with half-spread wings, uttering despairing shrieks, finally taking flight, hotly pursued by the now confident Sharp-shin until directly overhead. when I gave him the contents of my little 68-caliber collecting gun; he instantly wheeled to the right and made for the woods, but dropped dead before going fifty yards. Mr. J. N. Baskett once found a Sparrow Hawk (*Falco sparverius*) and a Flicker on the ground clutched in a life and death struggle, while dozens of the latter species sat on near-by trees, simply sneezing an alarm or threnody. I am inclined to think they are much less successful when attacking it about the tree trunks on account of its skill in dodging.

Mr. Bowles offers circumstantial evidence in the form of numerous feathers discovered in nesting cavities, of nocturnal visits of the Screech Owl (*Megascops asio*) which he places among its most dreaded foes. An unique instance of these two birds dwelling together in peace and harmony is furnished by Mr. John Meisky, Columbia, Pa. One day in May—about the 16th—he found a nest of the Flicker in a limb of a chestnut tree, and in the same hole was a Screech Owl. Visiting the place twice subsequently he found both birds present, seemingly contented. Although occupying the same cavity the Owl was not on the eggs.

The eggs and callow young are sometimes destroyed by

Red Squirrels (*Sciurus hudsonicus*) and subspecies, Flying Squirrel (*Pteromys volucella*), Weasel (*Mustela vulgaris*), Mice of various species, Red-headed Woodpecker (*Melanerpes erythrocephalus*), Crows (*Corvus americanus*), (*C. ossifragus*), Jays, (*Cyanocitta cristata*); and probably a few others. Mr. C. L. Rawson, who has had a wide experience in collecting, says that he has never seen snakes in holes in trees, *a la* school books, but mice, Red and Flying Squirrels often.

Mr. A. O. Garrett, Fort Scott, Kans., writes that the Flicker appears to be subject to internal parasites to an unusual degree. In skinning a number he found wire worms in the stomachs of fifteen or twenty; also parasites were noticed on the occipital bone in several cases.

Undoubtedly quite a number succumb to extremely cold weather. Prof. Jones records an instance observed in Iowa. Mr. J. H. Armfield notes it among the birds that suffered during the extremely cold winter. One found dead in a post oak cavity, Feb. 22, '99, at Greensboro, N. C. Harry Gordon White made note of one found dead with its feet frozen to a sheet of ice on the floor of a cavity, many years ago.

Man is its greatest enemy. Protection is needed particularly in the South, where most of the surviving adults, plus their progeny, reside for at least one-third of the year. Dr. M. T. Cleckley, writing from Augusta, Ga., states it is being gradually exterminated by the hunters. Mr. Gustave Kohn says that it is shot during the winter season by most hunters, as it is considered as good eating as Doves. He has seen them in bunches for sale on the streets and in the markets of New Orleans, La. This practice, although common enough in the times of Wilson and Audubon, has long ago ceased in the older Northern States. Mr. Fritz V. Raymond, referring to the town of Ludlow, Ky., writes that it is difficult to study birds whose nests are easily found, as a class of destructive boys scour the country for miles around and kill and plunder for the very love of it, stringing eggs like beads and taking the young birds. Plainly the most intelligent people of America are often too thoughtless and indifferent to instruct their children by precept and example in the common laws and economy of nature. As to the ignorant, next to enlightenment—with which I do not qualify my remarks when

including the vicious—a deep-rooted superstition tending to the protection and preservation of our birds is wanted. For example, the absurd saying, “The sting of a humming bird results in death,” has stayed many a hand itching to examine this living gem. Again, the number of Catbirds slain on the altar of a deep-rooted prejudice cannot be estimated.

Mr. Walter G. Savage, Hillsboro, Iowa, says he can note no increase or decrease in the past five years, but there has been a decrease of about 20 per cent. in the last twenty years.

MEASUREMENTS.

Doubtless a very large series of skins would show a gradual increase in size from south-northward in all measurements except perhaps the bill and feet. In a small series this can be emphasized only when the mean is obtained from remote localities. The table showing the sexual, individual and geographical variation requires no further comment than that the measurements are in inches and hundredths, and were taken by the writer from the dry skins of adult birds, secured on their breeding grounds. Late fall, winter and early spring specimens are not included. The measurements of young birds but a short time out of their nests follows. It would be well to state here that the first primary which is spurious or rudimentary, measures but a little over two inches in the juvenile, and less than two, usually about one and a half inches in the adult.

				Bill		
				Nostril to Tip	Depth at Nostril	Width at Nostril
Northern United States (Between 40° and 43° parallels lat.)	17 males	Aver.	Wing 6.04	Tail 4.15	Tarsus 1.07	1.09
		Max.	6.30	4.46	1.14	1.14
		Min.	5.90	4.00	1.01	1.01
	13 females	Aver.	6.06	4.14	1.06	1.11
		Max.	6.27	4.55	1.10	1.23
		Min.	5.75	3.80	1.00	1.02
Southern United States (Between 33° and 36° parallel lat.)	9 males	Aver.	6.00	4.07	1.07	1.07
		Max.	6.25	4.62	1.10	1.15
		Min.	5.75	3.87	1.03	1.02
	14 females	Aver.	6.00	4.01	1.09	1.06
		Max.	6.23	4.62	1.12	1.13
		Min.	5.75	3.69	1.05	.98
9 Juveniles.....		Aver.	5.75	3.66	.95	1.07
		Max.	6.00	4.05	1.08	1.11
		Min.	5.55	3.10	.80	1.01

PLUMAGE.

Individual Variation. I will first attempt the description of a typical spring specimen, collected April 20th, '98, in Chester county, Penn'a. Interscapular region, sepia ; Scapulars, wing coverts and exposed parts of secondaries, hair brown ; and the whole barred with deep brown, almost black. Rump white, upper tail coverts white, marked with black. Tail feathers glossy black above, the basal portion of all but the central shafts, chrome yellow ; under surface wax yellow, tipped with black. Primaries and secondaries above, dark-brown ; under surface with chrome yellow shafts and wax yellow vanes—with the following exceptions : beginning on a line near the base of the first primary and running diagonally to the tip of the first secondary, a deep edging of light chrome yellow extends to the body, and from the same line out to tip of wing an edging of dark-brown, heaviest at the tips, encircles the primaries. Bend of wing pale-yellow, spotted with black. Top of head, sides and back of neck, ashy-gray. Scarlet-vermillion crescent on back of head, and a broad black crescent across the breast. Sides of the head, chin, throat and forebreast, fawn color. Remainder of under parts dull white, with circular spots of black on each feather, becoming cordite on flanks and anal region. Sides and flanks washed with a pale fawn-cinnamon. Bill dead brown-black. Toes and tarsi plumbeous. Iris brownish. Individual variation is very great, particularly in the upper plumage. The back or interscapular region, runs through bistre, sepia, olive and hair brown to drab-grey in different specimens, sepia being the most common ; my only example of drab-gray coming from Georgia, where we are led to expect only the darkest birds. The scapulars, wing-coverts and exposed secondaries are usually a shade lighter, often as light as broccoli-brown ; the bars vary only in width. The top of the head is occasionally washed with umber or tawny, and the nuchal

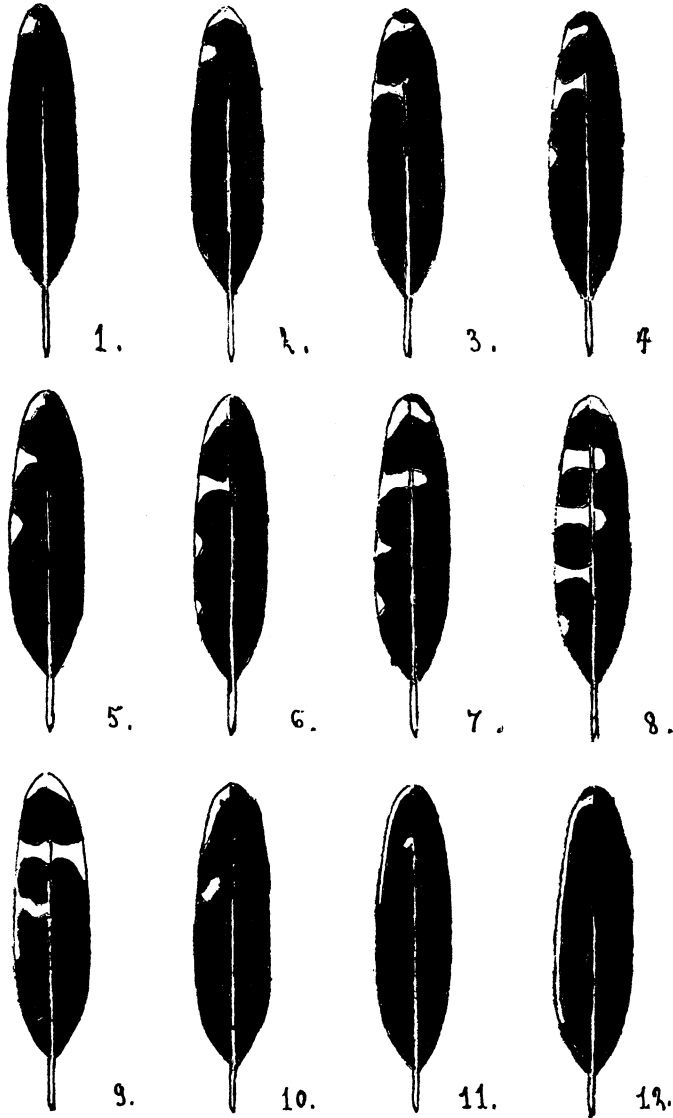
crescent varies greatly in extent and in color from scarlet to vermillion. The sides of head, chin, throat and forebreast from drab through fawn, ecru-drab to vinaceous-cinnamon. The black breast-patch being a generic character remains fairly constant. The under parts vary in the extent and depth of tone of the pale fawn-cinnamon wash, and the size and shape of the black spots. In four specimens the bend of the wing is apparently immaculate, but the small black spots are discovered beneath the surface. The absence or presence, number and extent of the light edgings on the tips and outer vanes of the primaries, and the tips, edgings and barrings of the rectrices offer a more complicated study, as variation occurs more frequently in these parts, and can be successfully investigated only with unstinted material.

Aside from the black malar stripes or "moustaches" which vary in length and breadth, a usually greater width of nuchal crescent, and an apparently less frequently spotted condition of the tips and outer vanes of the primaries of the male, I can detect no constant differentiation of sexes. The pattern of coloration of the fully fledged young is very near the same as the adults, but the spots and bars are usually much broader, giving a coarser and darker effect. The immature female as well as the male resembles the mature male in having black malar stripes, and the female in having a narrower nuchal band and in the extent of primary markings. The wings and tail are of a duller yellow and the feathers of the forehead and crown are usually tipped or mottled with scarlet vermillion, dragon's blood or brick-red, posteriorly fading to a rusty brown or burnt umber over the ashy-grey, which extends almost around the eye in some specimens. The lores are frequently blackish, and one specimen has a dusky superciliary stripe. The throat is often tinged with ashy, pronounced in one specimen, and occasionally a dull vinaceous-buff. The black breast tract is shaped more like a semi-circle than the crescent of the adult, and the whole body has a fluffy, lustreless appearance.

The color pattern of the tail coverts is subject to much variation at any period of the bird's life, but ordinarily follows a definite line of progression. Chapman, in *Bulletin American Museum Natural History*, Vol. III., p. 314, illustrates the development of the long upper tail coverts in fifteen figures,

beginning with the barred, running through the intermediates to the concentric or longitudinally striated, and terminating with the white-edged black feather. He says: "If we assume that the phases just observed epitomize a transition which is occurring in *auratus*, and if we further assume that *auratus* is the most recent offshoot of the Neotropical genus *Colaptes*, we should expect the more southern and older species to exhibit only the earlier stages of a color-pattern which in *auratus* has reached its highest degree of development. Unfortunately very large series of the extra-limital species are wanting; so far as my specimens go, however, they seem to support the theory advanced." The posterior upper tail-coverts of two Georgia specimens in juvenile plumage, now in my collection, are black with minute white spot at tip; a distinct and more primitive pattern than any described above, from which I infer it to be a stage almost outgrown and as seldom met with as the white-edged black feather—its present highest stage of color-pattern development. In the variation or transition of the color-pattern of the spurious rectrices, we have a similar condition due mainly to age. This rudimentary tail feather, present in all the Woodpeckers, lies concealed between the present outer and next to outer tail feathers. I consider it of sufficient importance to illustrate in twelve natural sized figures, showing the progression from the primitive dot to spots, cross-bars, and lastly the white-edged black feather, as something seldom occurring. My series of skins is not large enough to contain all stages; hence the sequence may be faulty and is undoubtedly incomplete. Correlative data is incorporated with the explanations on next page.

Seasonal Variation. There are two distinct phases of coloration, autumnal and vernal, although but a single annual molt. The post-breeding molt and renewal results in a somewhat deeper coloring of the upper plumage from nape to rump, and a pronounced primrose suffusion of the under parts, and occasionally the rump. After a few months of wear there is a gradual fading of the upper plumage and a more pronounced change in the lower parts, the primrose or straw-yellow first disappearing from the flanks and anal region, the middle of the abdomen only occasionally retaining a faint yellowish tint. The breeding season is particularly hard on the feathers of



EXPLANATION.—Nos. 1, 2 and 3, Juvenile, 9 examples. Upper tail coverts—black with white dot, incipient bars, or complete transverse bars. Nos. 4, 5 and 6, first renewal, 31 examples. Upper tail coverts—14 barred, 5 concentric, 12 intermediate. Nos. 7, 8 and 9, second renewal, or third stage, 9 examples. Upper tail coverts—6 intermediate, 3 concentric. Nos. 10, 11 and 12, most advanced stage, 10 examples. Upper tail coverts—2 intermediate, 8 concentric.

this bird. Its cavity-haunting habits gradually wear away the light-colored tips which have more or less obscured the bars and spots until all of the darker markings are fully exposed, resulting in a much heavier and darker appearance.

Geographical Variation. Dr. Allen, in the *Bulletin American Museum Natural History*, Vol. IV., p. 36, says: "It has been suggested that the resident form of South Florida would prove separable as a sub-species from the birds at large further north on the basis of its smaller size and darker colors. The average difference, however, as shown by a large amount of material, proves too slight and too inconstant, in either size or color, to make a separation practicable, as is readily shown by comparison of a considerable number of breeding birds from South Florida with a corresponding series from the Middle States or New England. Specimens nearly as dark occur, however, in New Jersey and Massachusetts, so that the average difference in color between Florida and northern birds is not appreciable. There is a lightening of colors as we approach the Plains. This is very noticeable, even in Minnesota specimens, and still more so in specimens from the Dakotas, Nebraska and Kansas." Since the above was written the separation has been made and the southern form given as resident in the South Atlantic and Gulf Coast region. Comparing my series of skins—twenty-three specimens—collected in DeKalb county, Georgia, with those collected in Chester and Montgomery counties, Pennsylvania, Lorain county, Ohio, and Walworth county, Wisconsin, I fail to find any constant difference in coloration, and defy any one to select the so-called *C. a luteus* from the mixed lot with any degree of certainty, except by means of the labels.

A small spring specimen taken in Bradford county, Florida, has a dull, faded appearance, slightly exceeding in size a breeding male, taken in Cleburne county, Arkansas. Both of these birds should belong to the southern form. It strikes me, however, that the stability of a sub-species must be very uncertain when it requires a painful scrutiny in the best light to determine the best shade effects of the upper plumage or a careful and laborious measurement of width of crossbars, combined with the slight and consistent geographical gradations in size, observable in all species having a wide range.

Abnormal Coloration. Albinism is said to be very rare among the *Picidae*. Ruthven Deane described the only example that had come under his notice—*B. N. O. C.*, Vol. V., p. 26—a beautiful specimen, taken near Providence, R. I., in '79, the red nuchal crescent and gold-shafts of the wings and tail being the only normal colors remaining, the rest of the plumage creamy-white. Chas. K. Worthen describes a similar example in the *Osprey*, Vol. I., p. 24, said to have been taken in Lee county, Iowa. It is also cream-white, with the exception of a pink nuchal crescent, and the under parts of the wings a rich yellow. A specimen in the young of the year plumage, taken in New Jersey and now in the Philadelphia Academy of Natural Sciences, closely approaches the albinistic phase, having a general washed-out appearance. One of my Georgia skins, an old male in rich autumnal dress, has a single white feather near the center of the occiput.

Melanism, a yet rarer condition of plumage, is represented by a single case cited by Mr. Deane in the above periodical. Records of the last are extremely unreliable unless the specimens are in hand. In proof of this, witness Mr. J. N. Baskett's experience: His little boy called his attention to a bird on the lawn; it seemed to the eye to be perfectly black, but under the opera glass faint markings characteristic of the Flicker, appeared; the bird's pose, shape and movements already established its identity. As it was Sunday and in town, this apparently remarkable melanistic form could not be shot, and the next day it could not be found. A small boy, however, appeared on the following day with the identical bird, it having been shot by his father while it was engaged in digging holes in the corner of his house. On closer examination its plumage proved grimy and greasy with soot with which it had doubtless come in contact while occupying a used chimney as a resting place. This specimen came from the hands of the taxidermist but slightly darker than normal, he having exceeded his instructions and given it a thorough cleansing.

HYBRIDISM.

In order to introduce the subject a brief synopsis must be given of the suppositions advanced by some of our most eminent ornithologists to account for this interesting condition: Although Baird had apparently solved the question satisfactorily away back in '58, other causes were suggested or assigned from time to time, almost up to the present date. Although suggesting that it might be due to environment or climatic influences, Maynard seemed convinced that it was but the insensible gradation of one to the other, *C. cafer* being but a more highly colored race; Ridgway appeared to have considered it the remnant of a generalized form from which the eastern and western representatives had sprung; an opinion shared by Newton at the present time. Coues was undecided as to whether it was a hybrid or transitional form. Hargitt, though leaning toward the theory of hybridization, suggests that it might be a sign of reversion to a remote ancestral plumage.

While hybridism has appeared the only solution to American ornithologists in recent years, it was not until '92 that seemingly overwhelming proof of the fact was presented by Dr. Allen in a paper entitled *The North American Species of the Genus Colaptes with Special Reference to the Relationship of C. auratus and C. cafer*. He finds a complete blending "along the line of juncture of the two species from Southeastern Texas northward along the western edge of the Plains into British America, and then westward in British America to the Pacific Coast in Southern Alaska." Mixed blood is of quite recent introduction in California, apparently, probably within the last thirty years. It is now quite common, particularly in the central and northern Pacific slope counties. While many are migrants from the north a number are residents or breeders. I have examined males taken in San Bernardino and Santa Cruz—April 27, '83, and Sept. 3, '95—which undoubtedly

belong to the latter class. A beautiful specimen, taken at Palo Alto, Nov. 26, '96, resembles Audubon's *C. ayresi*, with a half concealed red crescent, tipped with grey, and the orange-ochraceous wings and tail of *auratus*; head, throat, fore breast and malar stripes of *cafer*; and intermediate back. Cross-breeding is not confined strictly to the Red-shafted; the Northwestern form *C. c. saturator* also blends with the Yellow-shafted, as exhibited in a pair collected at Puyallup, Washington. The male taken April 3, '96, has a small patch of red on either side of the occiput, strongly suggesting an incipient nuchal crescent, several creamy-white feathers contrasting with the vinaceous of the rest of the breast, and the fourth rectrices are yellowish. This is probably a young bird, hatched the previous summer, as quite a few of the feathers in its forehead are red. It is only recently that *auratus* has come in contact with the Gilded Flicker, *C. chrysoides*, if at all. A supposed hybrid is described in the *Osprey*, Vol. III., p. 13, a bird taken in Arizona, showing red on the nape. No instance of the actual pairing and interbreeding of the pure Yellow-shafted with the Red-shafted Flicker has ever been published, but a writer in the *Auk*—Vol. II., p. 284—mentions having witnessed the courting of a true *auratus* and a hybrid in Southeastern Dakota; and Chas. T. Morrison—*O. and O.*, Vol. XIV., p. 146—found the hybrid mated with the *cafer* in the Big Horn range, and secured the eggs and parent birds. Rev. William Osburn writes me that he has been informed that the hybrid mates with *cafer*, nesting and producing young. Comparing and contrasting the plumage of the two species, the pattern of coloration is the same, with the exception of the nape, yet excluding the crescentic breast patch of black, there is a complete dissimilitude in coloration. The prevailing color is yellow on one and red on the other, even to the tint on the rump; and the grey head and brownish throat of one are transposed on the other. Hybrids and mongrels present a bewildering number of regular and irregular combinations. Red in the malar or nape is the first to appear as well as the last to disappear. This color about the head being characteristic of the Woodpecker family, is in line with the Darwinian principle of hybrids, showing a tendency to revert to the ancestral stock.

In the event of the western representatives becoming

absorbed, which, strange as it may seem, is a not impossible happening, it appears to me that it would not be replaced by a richer colored bird, such as the Palo Alto specimen for instance, combined with the more advantageous hardiness and aggressiveness of the eastern and northern bird, as suggested by a recent writer (Rhoads in *Science*, Vol. XX., p. 325), but rather, conforming to the general rule that complete hybrids are seldom fertile, a constant infusion of pure *auratus* blood would cause the *cafer* characteristics to become less and less evident until obliterated entirely. The very close affinity of the North American types in which the divergence in colors is the greatest, tempts me to propound the following question: Is it less than improbable that the original *Colaptes* stock has been dichromatic, the yellow phase evolutionizing into one group of which *auratus* is an example, and the red phase into another group of which *cafer* is a representative and *chrysoides* standing for the intermediate? The Red-shafted is less prone to wander; a few specimens have been taken in Iowa, Nebraska and Kansas. A hitherto unpublished record from Forest City, Winnebago county, Iowa, by J. Eugene Law is the easternmost perfectly authentic record I have seen. Mr. Law assures me that it is an unquestionably pure *cafer*, shot and brought to him by some of his scholars on Sept. 19, '90. The specimens taken in Van Buren county, Iowa, in March, '78, by William Savage, proves to be a well-defined hybrid.

ATAVISM.

It need not necessarily imply that all birds varying slightly from the normal are the result of mixed union, because undoubted mongrels along the line of contact sometimes possess similar characteristics, since Darwin says: "In a breed which has not been crossed, but in which both parents have lost some character which their progenitor possessed, the tendency, whether strong or weak, to produce the lost characters might, for all that we can see to the contrary, be transmitted for any number of generations. When a character which has been lost reappears, the most probable hypothesis is that the character in question has been lying latent, and at last under unknown favorable conditions, is developed." As previously mentioned, there is an occasional specimen, more noticeable in the juvenile, having the crown more or less tipped or washed with brownish or with scarcely more than a suspicion of ash on the throat, colors belonging to the western species, just as truly as the scarlet malar stripe or ruby colored shafts, although not as conspicuous. An anomalous specimen, secured in New York markets and described by Gerrit S. Miller, Jr., in the *Auk*, Vol. XIV., p. 275, is an almost perfect intermediate between *auratus* and the Cuban Flicker *C. chrysocauleus*, and would doubtless be considered a hybrid but for the fact that the breeding ranges of the two species do not overlap. To the best of my knowledge this is the only specimen with spotted rump taken on the North American continent. Possibly the abnormal Gilded Flicker noted under the head of *Hybridism* belongs properly to this section. An old male showing the effects of previous gunshot wounds in wing and mandible, taken in DeKalb county, Georgia, Jan. 27, '99, has a single red feather over the right eye. I shot an adult male near Berwyn, Chester county, Penn'a, Oct. 3, '94, which has a narrow border of scarlet on the upper margin and end of the black moustache; a not at all remarkable condition, occurring

repeatedly in almost every State in which the Flicker is found, and quite as frequently along the Atlantic coast as anywhere. With the exception of the apparent hybrids taken near Toronto, Philadelphia and New Orleans, scarcely a well marked mongrel has been captured east of the Mississippi. The so-called hybrids varying but little from the normal, are often separated by a thousand or more miles from known points of interbreeding, and are surrounded by hundreds of pure birds as far as can be told by the plumage. In view of these facts we may ponder on the probable source of the alien blood. If it is the fading vestiges of an earlier infusion, it should have been much more noticeable twenty years ago, since a hybrid crossed regularly with pure stock would soon have a very small proportion of foreign blood, 1 in 16,384 in fifteen generations for example. Mr. James Newton Baskett is very much inclined to attribute such instances, especially when found on the Atlantic slope, as pure variation, either rudimentary or vestigial, perhaps the latter, since the genus is quite probably of southern origin, and most all southern and southwestern species and races incline to red moustaches; *C. auratus* being a late northward-tending species, showing occasional tendencies to revert. A hypothesis in part or in whole shared by not a few. Dr. W. E. Rotzell also questions the occurrence of hybrids in the East, *C. cafer* not being present; and inclines to the opinion that we must of necessity seek a better understanding; the so-called hybrids may be explained by the fact that there is a strong atavistic tendency in *C. auratus*, the form reverting so frequently in some particulars to the ancestral type, exemplified so frequently in the head of the young.

CONCLUSION.

It is not my purpose to generalize or make further deductions from the evidence collected, but there are some facts and thoughts which appear to me to have not an unimportant bearing on the subject in general. Few species offer greater possibilities and at the same time more difficulties in the way of a close study, than this bird. To deduct the general facts or principles underlying the migration, reproduction, moulting, mode, variation, hybridization, etc., of this one species would in all probability go far toward solving the many vexed problems so important to science and yet so imperfectly understood. The Flicker is both progressive and energetic—a typical American. It may be said to be perfectly fitted or designed to meet the conditions of its environment, but the surroundings are changing, and its habits, food or plumage may alter perceptibly in the not remote future. It doubtless represents a comparatively recent off-shoot of the genus, and is yet undergoing certain modifications of an evolutionary nature. Undoubtedly its comparatively weak curved beak, so like a pick and so unlike the drill-shaped bill of the Woodpecker, would become so less able to withstand the strain of hardwood cutting the less it is used for that purpose, and burrowing in the earth, soft wood and bark become the extent of its capabilities in that line; but it by no means follows that its chiseling power is suffering marked diminution within recent years or the immediate prospect of its curtailment as long as timber is so plentiful. Favorable to the preservation and increase of the species, I may mention an almost perfect protection during the critical breeding time from the inclemency of the weather, and carnivorously inclined beasts, birds and reptiles; great powers of reproduction; abundance of suitable food; hardiness; absence of harmful traits; ease of adaptation to conditions of surroundings; and the possession of the great advantage over nearly all of our Woodpeckers in having a much less con-

spicuous if not mimetic plumage. Its very natural advantages over all other members of the tribe inhabiting the same regions would tend to its preservation, increase and comfort when the less versatile or adaptive species decreased or became extinct under changed conditions; exceptions being made to the Downy (*Dryobates pubescens*), for which there appears a distinctive place, and whose dwarfishness exempts it from persecution by man—Nature's worst enemy.

ERRATA.

Page 3, 6th line from top, for "Anamalium" read Animalium.

" 10, 9th line from top, for "kind" read bird.

" 11, 9th line from bottom, for "kind" read bird.

" 13, 15th and 2nd lines from bottom, omit quotation marks.

" 14, 17th line from top, for "loss" read less.

" 15, 6th line from bottom, under "Average Date When Common" for "April 8" read April 3.

" 19, 6th line from bottom, insert **Autumnal** (to precede paragraph as subtitle).

" 35, last line, for "infloored" read unfloored.

" 38, 15th and 16th lines from bottom, for "Duckwood" read Kirkwood.

" 39, last line, for "Morrel" read Morrell.

" 42, 7th line, for "properties" read proportions,

" 45, 1st line, for "scientific" read intrinsic.

" 47, 11th line from bottom, for "exlcusion" read exclusion.

" 55, 4th line from bottom, for "harmless" read barbless.

" 61, 5th line from top, for "important" read unimportant.

" 62, 12th line from top, for "group" read ground.

" 66, 13th line from top, for "68" read 38.

" 66, 10th line from bottom, for "Sreech" read Screech.

" 72, 16th line from bottom, for "as something" read asymmetry.

" 74, 17th line from bottom, for "twenty-three" read fifty-three.

" 75, 6th line from bottom, for "corner" read cornice.

" 78, 3rd line from bottom, for "specimens" read specimen.

" 82, 1st line, for "natural" read material.